THE IRON AGE

New York, December 20, 1923

ESTABLISHED 1855 VOL. 112, No. 25

Machining Methods at Cash Register Plant*

Special Equipment and Devices for Profiling, Drilling, Milling, Grinding and Press Work—Close Requirements in Respect to Castings

BY L. S. LOVE

MANY of the parts of the registers built by the National Cash Register Co. at Dayton, Ohio, are cast. Some of these castings are of gray iron, others of non-ferrous metals, such as bronze, brass, aluminum, type metal, die castings, etc., depending upon the particular service required of them. In all there are about 40 alloys used. These castings are all made in two foundries, one for iron and one for non-ferrous metals. The iron foundry with 43 molders takes care of 21 tons of iron per day, with an average weight of castings of 1.10 lb.

Patterns used in register work are all of metal. A wood pattern is first made, from which is cast a metal pattern; the wood pattern of course made sufficiently large to allow for two shrinkages, that of the metal pattern and an additional shrinkage in the casting itself. Also the wood pattern is made sufficiently large to permit the metal pattern to be machined all over, including all surfaces, angles, and drafts. This pro-

*Tool making as practiced in the National Cash Register plant was described in the issue of Sept. 13, the making and maintenance of some of the machinery was discussed in the issue of Aug. 30 and the notable amount and variety of automatic conveyors in use were the subject of numerous illustrations in the issue of Oct. 25.

As Many as 32 Spindles Are Used in a Row With Auxiliary Tables to Facilitate Sliding the Jig From One Machine to the Next, So That All Holes May Readily Be Drilled Through One Jig

duces a pattern which will make an accurate mold. All metal patterns are boarded. On such castings as will permit, special flasks are used in place of the ordinary square or rectangular flask. They conform roughly to the shape of the piece, thereby saving considerable sand and also in weight of mold to be handled by the operator from the molding machine to the floor.

A daily chemical analysis is made of pig iron used and also of the scrap from other days' pour, so that uniform analysis of iron can be maintained, to secure strength and machinability. This analysis is also used on alloys daily. Most of the castings are pickled, two men with the aid of hoists handling 22,000 lb. daily. This reduces chance of breakage and also, reducing scale, makes machining easier. Due to the patterns of machined finish and careful check on analysis, a uniform machining allowance is made on all castings of 0.040 in. This must take care of any warpage as well as removal of scale.

All castings are inspected, not only for appearance, but actually with inspection tools. The castings are placed in inspection jigs or on parallel plugs on a surface plate and checked by surface gages to hold machining bosses within the limit allowed. This allowance is imperative, regardless of size or shape of the casting. A profiling operation then machines the bosses, this job being easily handled due to uniform amount of metal to be removed.

Castings which are to be machined are loaded from the inspection bench in racks mounted on truck wheels, on which they are rolled to the machine department, and when machined are loaded back on the truck to be moved to the assembly floor or assembly stock, so that a counted lot of castings moves in a group from inspection to assembly.

Such castings as are to be japanned are dipped after leaving the inspection bench. Wire baskets are conveyed on overhead trolley to the vat, which is mounted on an air hoist. Elevating the vat has proved better than lowering the work, as it saves a break in the track and also generally makes less splash when the work enters the japan bath. Baskets are moved along over a draining trough to the drying oven. This foundry also handles castings up to 2 tons for use of the tool room, in construction of special tools or machines.

The care used in making patterns and watching analysis of iron daily has reduced the percentage of waste to an exceptionally low point. In 1921 the loss in the foundry amounted to 3.2 per cent and in 1922 to 3.5 per cent. One week this year the loss went as low as 2 per cent. Loss includes bad castings, breakage and warpage. And inspection is 100 per cent.

In the non-ferrous foundry 5000 lb. of bronze are cast daily. Here also the same accuracy is practiced as being absolutely necessary in making so many different alloys and metals. There are two kinds of die castings produced, one with a zinc base and one with a tin base.

Reference was made in the description of castings inspection to the loading of frames on trucks having shelves; that these trucks carried the frames to the various machine operations and then to the assembly department. These frames go first to the profilers on which the bosses or pads are surfaced. The method of setting the profiler head for depth or to secure proper height for the various pads is of interest. On each head is an adjusting screw set at a predetermined depth to permit sufficient vertical adjustment to accommodate varying heights of pads. Under these screws resting on blocks attached to the rail are movable step blocks with the number and heights of steps for the different bosses on the frame being machined. The machine head is raised or lowered until the screw rests on the step to give proper height to the particular boss being faced.

After the first piece is removed from the machine, following operation on the first side, it is placed in a testing fixture to check parallelism and relative height of the pads. During the run about every tenth piece is so checked to test for wear on the cutter.

One specially built machine is used in this class of work. The machine is a 30-in, gear-driven profiler designed by the National Cash Register Co., and built by the Pratt & Whitney Co., having since become part of the line offered by the latter. In this machine both spindles, which are independently adjustable on the rail, are used in conjunction with the step blocks for different heights of pads. One of the unusual features of this machine is the construction of table bearings, in which the sliding friction customary to this type of machine has been replaced by a rolling friction, making it possible for the operator to move easily as great a weight as 1800 lb.

The machine was built to surface the so-called class 2000 register base which is the largest casting in production at present in this plant. The base itself is not heavy, but requires an exceptionally heavy fixture.

In this fixture are incorporated support jacks, which are one of the company's standardized fixture parts. The casting is laid on registering pads in the fixture and is then supported under the points where cutting pressure is applied by wedge adjusting jacks. These are hardened pins of about ½ in. diameter adjustable vertically by means of sliding wedges under them, carried in the fixture base. The wedges are pushed in and clamped by wing nuts at their outer ends. The evolution of these jacks was shown in a previous article. In this manner proper support is secured for the casting without straining it.

Other profilers are used with both spindles working on similar jobs, and some are used on the customary run of profiler work, for instance, in form milling quadrant castings with the guide pin following a master form.

The drilling and reaming of many of the surface and side holes in these frames, some of which appear to be honeycombed with holes, is accomplished, when possible, in turret type multiple spindle drills. These machines were designed for this company's needs and have been in the plant for many years, some of them probably being among the earliest of this kind of machine built. The machines are entirely automatic in operation requiring only loading by the operator, all subsequent operations being controlled by cams. The machine stops automatically when finished, waiting for new casting. One man can care for three. One interesting feature on these drills is the fact that side holes are drilled at the same time surface holes are, even where the side holes are at an angle; the drive here being by universal joints. Blocks guiding the drills move to and from the work automatically.

Owing to the fact that much of the company's product comes through in comparatively small lots, it is necessary to use a large quantity of the ordinary type of high speed drill with suitable fixtures. On these it is not economical to use power or automatic feeds. Machines are so arranged that it is possible for an operator to progress along a line of these drills with special tables on a level, employing as many as 18, 24 or even on occasion 32 spindles on one casting.

An example of one frame is what is known as class 2000 printer back frame, which has 108 holes. Some of these holes are so close together that it is impossible to drill all in one jig, so that two are used. The work is placed in the first jig registering from pads on its base.

The construction of this jig is of interest as being exemplary of the company's standardization practice and the making of jigs which will wear long and hold their accuracy. The cover carrying the drill bushings is hinged. The hinge pins are 7/16 in. diameter, hardened, straight ground, bearing in hardened and ground bushings. The bushings have collars or end flanges, also hard, to take care of any end wear. The bottom of the cover is faced with hardened pads, which strike on hardened stop posts. All the clamps to hold the work are in the base of the fixture, so that they cannot spring the cover and affect the alinement of the drill bushings. The side location of the work is by means of plunger type of screws pushing it against a hardened plug, thereby avoiding the twisting effect of the screw turning directly against the work which causes inaccuracy. All important holes in this jig are double bushed, so that wear can easily be remedied by replacement of the second bush.

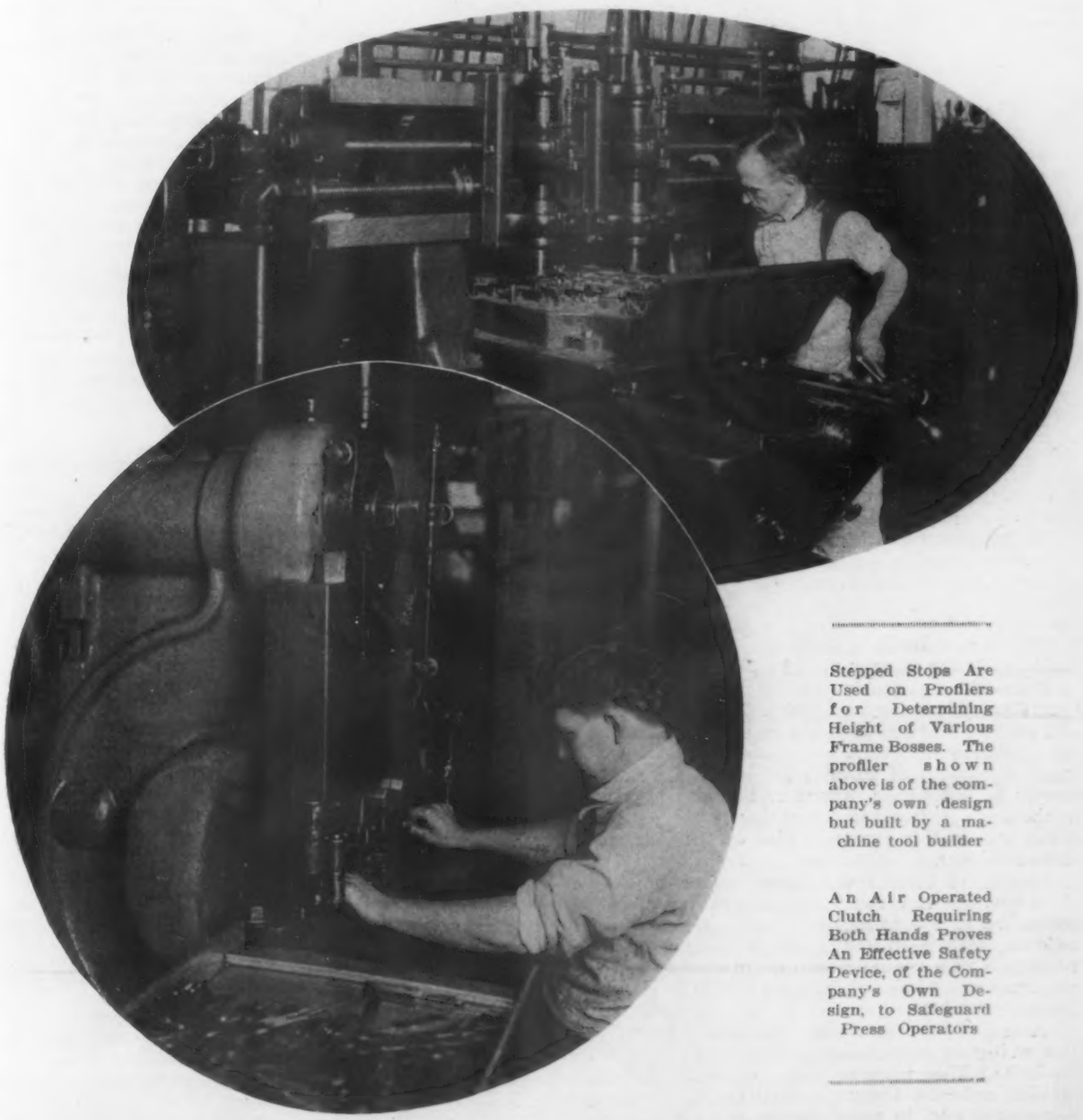
The second jig for this job registers the casting

from side holes drilled in the first jig. Large two sided jigs such as this one are provided with horns to assist the operator in rolling the jig over.

As the first casting going through comes from this drilling operation it is tested on a gage. This gage plate is equipped with hardened bushings. A set of plug gages is provided for testing all holes. They are relieved on the ends, or beveled, and bear only on one side at the front end so that by turning slightly the exact position of any inaccuracy in a hole may be determined. Drilled castings are so checked at frequent intervals during the run.

The question here naturally arises as to why the company after going to the expense of making costly jigs, goes to additional expense to make up a lot of costly gages to test work during production. This is done simply because they have found it profitable so to do. Regardless of good fixtures and care, inaccuracies are bound to occur at times, and it is less costly to test periodically during a run than to make up a lot of parts and find when they are drawn from stock that somewhere something slipped or went wrong causing the whole lot to be scrapped.

In the class 2000 base castings there are a number of holes to be drilled in the edges. This work is handled in a machine designed by the National Cash Register Co. but built outside the plant. The machine is a hinged arm-radial drill with direct motor drive using a vertical motor coupled direct to the drive shaft of the machine. The work is held in a jig mounted on a swiveling fixture, so that holes in all sides can be drilled in one set up. On the fixture are locating blocks with guide bushings for the drill. Immediately behind the drill spindle, mounted on the arm is a fixed locating pin with a beveled point. In the drilling operation, this beveled point seats in a hole in the bushing block, thereby automatically centering the drill over the guide bushing. This method materially assists the operator in quickly registering the position for the tool to drill each hole. A test gage has been provided to check accuracy of this operation.



Stepped Stops Are Used on Profilers for Determining Height of Various Frame Bosses. The profiler shown above is of the company's own design but built by a machine tool builder

An Air Operated Clutch Requiring Both Hands Proves An Effective Safety Device, of the Company's Own Design, to Safeguard Press Operators

The surface holes in this same base casting are drilled in a specially built fixed position multiple spindle drill. The machine is also used for reaming, and can be arranged to counterbore some of the holes. It is not used, however, for the latter operation, as it has been found that such holes as need counterboring can be done more rapidly in a hand feed machine. A test fixture of unusually large size is employed to check the accuracy of these drilled holes.

In one quadrant type casting known as class 2000 keyframe number 5, there are 30 different operations, one of these being the drilling of 78 holes. The piece when finished carries nine tumbler locks; for each lock

there are three tumblers. The drilling of these holes is handled in a special fixture, under the ordinary type of multiple spindle sensitive drill.

The company on small drills follows the practice of grinding drills by hand, claiming that a man doing this work day after day becomes so expert that he can secure more uniformity of lip length on drills than is possible by machine. Tending to prove the correctness of this is the fact that on many small holes, for dowels, etc., driving fits are secured without reaming.

Where there are so many holes in a casting, it is only natural that there should be considerable tapping to do. To facilitate tapping operations the company has developed a tapping attachment operating four taps and attached to an ordinary commercial tapping machine through a drill chuck. This multiple tapping attachment is satisfactorily operating in daily production.

In the frame department, in addition to the numerous drilling operations, there is considerable milling done. There are so many of these operations which are interesting, that it is only possible to mention a few of those which are typical or show high production or the overcoming of some very difficult obstacle.

In one case a shaft bearing casting having six ring type bearings is mounted across the table in a fixture on a Lincoln milling machine. The operation is gang straddle milling of the sides of the bearings and slabbing the ends of the frame. There being six lugs or bearings, thirteen cutters are employed for the operation. The cutters for this operation are ground and set up on the arbor in the toolroom, so that all the operator has to do to replace a set of dull cutters is to place the arbor full of sharp cutters in the machine and proceed with his work.

Form milling is largely resorted to, and work of this nature is handled with great accuracy considering that only one cut is taken to secure limits of plus or minus 0.001 in. One example is the milling of backs two at a time.

In the milling of keyguide slots in tie bars, 34 cutters are employed in the operation in a Lincoln miller and one operator cares for three machines. This company was probably one of the first in the country to use the jump feed and quick return on manufacturing milling operations. Double fixtures are used, one end being loaded while the other is being machined.

Class 700 segment frames call for a form milling operation. Three are machined in one set up in a Lincoln miller. Fixtures employed in this operation, as is also the case in several others, are adjustable for length by means of movable blocks so that different lengths of frames for various models may be handled in the same fixture, thereby saving in the fixture investment. In this operation also one man operates three machines.

Certain of these frame parts have a number of shaft bearings in a row. After all milling and other operations have been performed, and the castings are relieved of these strains, a line reaming operation is performed in a special machine. In some cases there are two lines of holes of different size to be reamed in the same machine.

A special indexing fixture developed is for milling two widths of slot in one quadrant. For doing this work the milling machine is also equipped with a special two arbor head mounted on the column of the machine similar to the mounting for an ordinary vertical attachment. This is driven by the machine spindle. Owing to the peculiar nature of this work and the liability for inaccuracies to creep in, each piece is checked in a special test gage as it comes from the machine.

Several special milling machines are required for some of the work in this department. One of these is equipped with an indexing mechanism mounted at the side of the machine. It is used for milling slots in side frame quadrants.

A milling machine designed and built in the National Cash Register Co. shops has six milling spindles at different angles for handling a piece of peculiar shape milling six surfaces at once. A gage is employed for checking this work. It has locating pins which are the same as those in the milling fixture and has a block on which is placed a dial indicator for testing the accuracy of the work.

Another interesting gage employed in this department is used for testing a class 700 upper back. The casting is registered from drilled holes, and the relation of the milled rib machined in one cut is checked with relation to these holes by means of a pointer gage. The limit is plus or minus 0.001 in. The gage is adjustable for length of piece to be tested.

In addition to the numerous tests and checks of accuracy during production, a final inspection is made by regular inspection department employees before work goes to the assembly department. These inspectors while working regularly in this particular department compose a branch of the main inspection department.

In what is known as the lathe department, which is a comparatively small portion of the plant, there are several fixtures of unusual interest. In one case it is necessary to hollow mill portions of a rather odd shaped casting known as a segment frame of the class 700 register. This casting would be an awkward one to swing on the spindle as the chuck required would be very bulky. It is therefore placed in a fixture mounted on the turret base of a turret lathe. This fixture is so arranged that it indexes as would the turret. The hollow mill is carried in the lathe spindle.

Air chucks are increasing output as much as 40 per cent. In one case a magazine feeding to an air chuck on the turret lathe spindle handles 850 pieces on a facing and reaming operation in 9 hr. These are bronze type segments of the class 800 register. The machine operation is performed on a boss which is at the radial center of the segment. Unloading and ejecting are also performed automatically.

A special driving chuck for arbor work has been developed. This permits work to be placed in the lathe or removed without stopping the spindle. In the body of the chuck are two driving pins extending beyond the face of the chuck and lathe center. These driving pins are controlled by a collar and can be withdrawn into the body of the chuck flush with its face by this collar which is actuated by a yoke lever mounted within convenient reach of the operator, this withdrawal permitting removal and replacement of work. Ten of these chucks are saving $2,500 a year on this class of work.

In this plant are two press shops. One is devoted to smaller work, the other to larger pieces, such as cabinet parts.

In press shop No. 1 there are 16,000 dies for work on 10,000 pieces, among which are dies for several unusual operations. Probably the most noteworthy examples of achievement in press work is the shaving die operation. There are dies used for truing cams which can be produced to an accuracy limit of 0.0002 in. The work is performed on what is known at this plant as a jogging press developed by the N. C. R. The cam which operates the press has an uneven surface of humps and hollows, which serves to vibrate or chatter as the die is closed, thus producing a clean sheared edge on the work.

An interesting example of the use of shaving dies is the cutting of two notches in the class 900 counter transfer bar. These notches must be accurate to plus 0.001 in. or minus 0.001 in. in relation to a pin in the transfer bar on which the bar rocks. This operation is now performed at a cost of 6 cents per hundred as against a former cost of 35 cents for a milling operation. Indicator frame racks are shaved to a point of accuracy which shuts out daylight against a locating gage.

An unusual operation was noted in the press department. This consists of piercing a number of rectangular holes in a quadrant shaped brass casting, used as the class 2000 keyframe guard.

Swaging is resorted to in a number of instances. In one case a blank for a counter pinion was reduced from ⅛ in. thickness to 1/16 in., leaving a hub. The pinion is later trimmed.

Air is used for ejecting in a number of cases, the air

jet valve being controlled by the operator's foot, leaving both hands free to operate the press. Throughout the department it may be noted that operators are protected by air operated safety clutches controlling the presses. These were designed and built by the company. They are provided with two levers requiring two hands to operate.

In the press shop is a repair section for making minor repairs in a hurry rather than to call on the general machine department. When a press is faulty in operation a card hanging on it is turned out displaying a sign "Out of Order."

Press shop No. 2 which handles cabinet and external parts and also the larger internal parts made of sheet is laid out somewhat differently from press shop No. 1. Work in progress is stacked on platforms ready to be picked up by the industrial truck and carried to the press for forming. The truck is also used for carrying dies and bolsters to the press bed or to the die storage bins. The truck used is of the tier lift type, which will reach from the lowest to the highest storage shelf or can be set at any intermediate height, permitting the bolster and then the die to be pushed directly from the truck platform to position without any man power lifting. All bolster plates, die shoes and punch holders in this department are interchangeable. A complete record of die changes is kept as well as of work in progress, so that a new die may be delivered to the press as the last job on it is finishing.

Under each of the large presses is a pit for easy access and adjustment of spring work, etc., when required on forming dies.

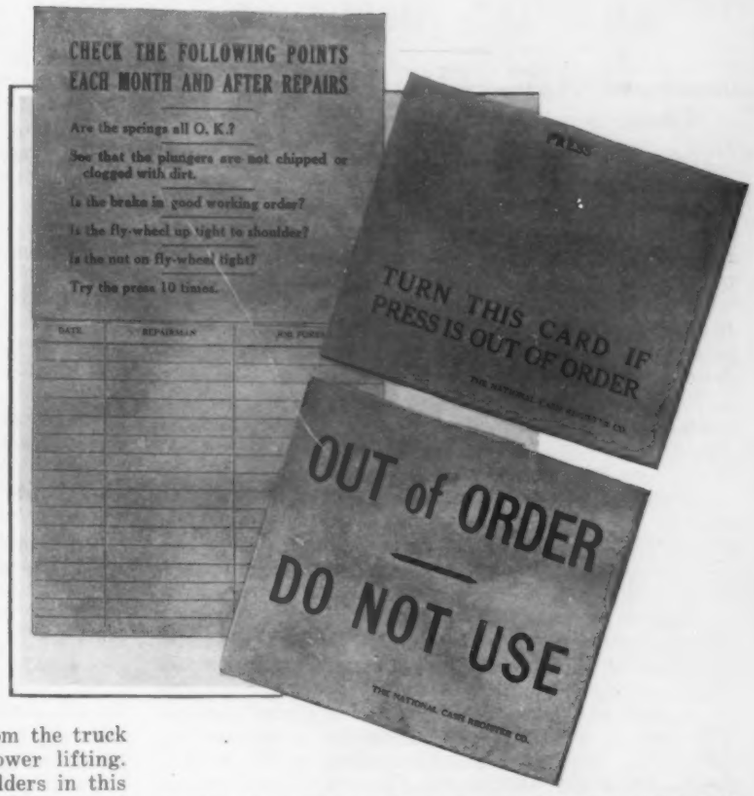
One very economical practice in this shop is in the making of field and armature laminations for use in the motors which the company makes to operate some of its registers. A strip of steel is run through the press which is equipped with a tandem die. From this strip are pierced, notched and blanked the armature laminations and the portion of the strip surrounding is then blanked for the field laminations. As the finished work drops through the press bed it stacks on upright rods, ready to be used for winding.

Immediately adjacent to press No. 2 is a section devoted to grinding. In this department are several special grinders performing some interesting operations.

One is a special roll grinder provided with hopper feed. These rolls are tubular, about ⅜ in. diameter and ¼ in. long. They are thrown into the hopper feeding into a vertical magazine. A sliding feed conveys them to an expanding mandrel in front of the wheel. All motions are cam operated. The machine turns out 830 per hour or about 100,000 per week.

A centerless grinder is used on shafts 15½ in. long by 9/16 in. at the rate of 4 per min. This type of machine is used on both rough and finish grinding. Another special grinder is used on taper pins, making them automatically from the wire. The wheel is controlled by a cam as is the cutting off slide.

One example of plain grinding is noteworthy in that the shaft is ground to an accuracy limit of 0.0008, in. in one pass over and back, taking 0.007 in. in one cut from a shaft 5/16 in. by 10½ in. at the rate of 110 pieces per hour. A tube 0.576 in. rough diameter by 11 in. long is reduced to 0.561 in. for finish or 0.016 in. in one pass at the rate of 9 per hour.


CHECK THE FOLLOWING POINTS
EACH MONTH AND AFTER REPAIRS
Are the springs all O. K.?
See that the plungers are not chipped or clogged with dirt.
Is the brake in good working order?
Is the fly-wheel up tight to shoulder?
Is the nut on fly-wheel tight?
Try the press 10 times.
DATE
REPAIRMAN
TURN THIS CARD IF PRESS IS OUT OF ORDER
OUT of ORDER
DO NOT USE
THE NATIONAL CASH REGISTER CO.

Considerations of Safety Have Demanded the Use of the Card and Report Blank Shown Above. They are employed in connection with minor repairs made locally, without recourse to the general repair department

Tier Lift Trucks Save Much Hand Lifting of Heavy Bolsters and Dies

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Seven trustees have been named for the newly-created Economic Foundation in New York and charged with the duty of finding facts which bear on social, economic and industrial problems. Various interests will be represented, the object being to bring together a group of men, each of whom shall be expert in his line, thus giving a tone of impartiality to the voice of the group. Thomas W. Lamont of J. P. Morgan & Co. is chairman of trustees and labor is represented by John P. Frey of the American Federation of Labor. The system of election provides for perpetual representation of such interests as banking, manufacturing, organized labor, the legal profession, colleges, agriculture and economic and social reform movements.

ROLLS AND THEIR CARE

Importance of Avoiding Unequal Expansion and Contraction—Rational Use of Water Urged

Of all the forces known to man there are possibly no powers greater nor more irresistible than those of expansion and contraction. We have learned to control many of the once deemed uncontrollable influences, but these forces have remained among the unconquered, according to a writer in "United Effort."

Hot mill experts are so cognizant of the powers of expansion and contraction that their routine of operations is governed entirely by them. They have formulated a simple law which they try to follow religiously, i.e., avoid too sudden a change in temperature of the rolls. To be careless in this respect is to court disaster, for the one certain way to ruin a roll is to ignore this law, either knowingly or otherwise.

However, it is to cold mills that attention is directed. By a cold mill we mean to imply the thought of rolls running and operating in an inexpanded state. This condition is brought about generally by the judicious application of water, where and when necessary.

To heat and expand the surface of a roll beyond a certain normal rate puts the interior in such a state of tension that it must certainly burst apart, sooner or later. Conversely, to cool and contract the exterior of a roll too suddenly over an expanded interior will just as certainly open up cracks in the surface, which will tend materially to shorten its life, even if cooled uniformly around the roll. And heat or cold applied to one side of a roll will invariably lead to breakage.

Granting that a roll in an expanded state is in the most critical condition, recognized by hot and cold mill men alike, there is a call for great watchfulness on the part of the cold mill man, if he would endeavor to keep roll failure at a minimum. Let me reiterate and emphasize to the cold mill man the law of the hot mill; avoid too sudden a change in temperature of the rolls. This applies to all kinds of rolls, both iron and steel and their alloys.

Generally we find the greatest trouble at the roll necks, where small diameters are subjected to the sudden heating influence of friction. With the necks out of sight and lost, in the attention given to the bars being rolled, it is natural that they often escape notice until they are very hot. And at this time a great mistake is often made, water being turned on to the hot neck. A more perfect way to ruin the roll can hardly be found. If that neck is cooled suddenly on the outside, while the interior is hot and expanded, it will crack or strain the neck to such an extent that it can be expected to break at any moment, possibly at some time when there is not even a bar in the mill.

It takes time to slack the screws, stop rolling, tear down the splash boards, let the neck cool down, grease up and get back to proper gage. But it is better in many ways to do this than have a roll break and have to change on account of a broken neck. Too often, not only the one roll is ruined but, if the rolls happen to have interlocking tongues and grooves, the other rolls may be spoiled as well.

Heating of the necks generally caused by friction alone, while the bodies usually heat up in the pass or passes being used. Knowing that, if a sudden change in temperature is avoided, less roll trouble will be experienced, it is the practice to apply sufficient water to keep the roll cool. But to keep the roll bodies at a normal uniform temperature is not always easy. Some parts of the roll will not be rolled upon at the time and will not come in contact with the hot metal. No water should be directed upon this part of the roll, the passes being used alone getting the supply. But a copious supply here misdirected is wasted effort.

To be used to greatest advantage, water must hit the roll where it can follow around and remain longest in contact with the rolling surface. It is a mistake to direct water into the pass where the bar enters, for water can occasion more actual wearing of the groove than the bars themselves, strange as this may seem.

If during the rolling the pass has become extremely hot, due to some untoward circumstance, we have here the same necessity for caution as with the neck; it must not be cooled too quickly.

Ideally to keep a roll body at a normal uniform temperature, the aim should be as nearly as possible to have a copious flow of water, properly directed, only where and when the bar is in the rolls and at no other place nor any other time; in other words, synchronizing the application of the cooling agent with the heat.

There is seldom enough water properly directed on the working passes of rolls, the entire roll body generally being kept constantly in the flow. Less water can be used to better advantage if used ideally.

In blooming mills and some other types it is a simple matter to have a device to operate valves in the water supply line, so that when a piece is about to enter the rolls the water is turned on. It can also be arranged in many instances that a copious flow is fed on the rolls only on the pass being worked, either by water pipes on movable side guards or automatically controlled valves in the pipes on stationary fixtures.

Necks must be watched constantly, bearing in mind that suet is just as efficient today as ever.

Due cognizance should be taken of the fact that roll trouble is greater in winter than during the warm weather. Water can have the chill taken off with steam in the line, causing it to be less destructive and just as efficient. Rolls also can be kept in a warm place to great advantage. Hot steel should not be used to take the frost out of them.

Expansion and contraction are the natural enemies of rolls. Water correctly applied and judiciously used will in great measure prevent trouble. These remarks are not made for the sake of the rolls alone, for their cost is little compared to the actual loss occasioned by a mill delay.

Embrittlement of Malleable Iron During Galvanizing

WASHINGTON, Dec. 18.—Director G. K. Burgess of the Bureau of Standards in his annual report gives a summary of an investigation regarding galvanizing. The research has been completed and covers an investigation on the embrittlement of malleable cast iron during galvanizing. Following is a summary of the work given by Director Burgess in his annual report:

Recent investigations have shown that commercial malleable iron is often embrittled as a result of galvanizing by the "hot-dipping" method. The present study, however, has shown that this change results from quenching from certain temperatures in the blue-heat range and that the galvanizing plays no other part than the means of heating the iron. The low-shock resistance of such material after hot-dip galvanizing is often very striking. The present study of the problem showed that the magnitude of this deterioration varied with different samples of iron. The Izod impact test was used as a convenient means for measuring the resilience of the metal. The embrittlement was found to be limited to a fairly definite range of quenching temperatures. Aging after treatment did not appear to affect the results. The rate of cooling from the blue-heat range was important, however. If the malleable iron was slowly cooled instead of quenched from these temperatures, the impact resistance was not nearly so seriously impaired. It was also found that the upper limit of the "embrittlement zone" lay a few hundred degrees (C.) below the critical point. Quenching from temperatures in this upper safety zone increased the resilience of the iron and made it immune to the blue-heat deterioration. The information obtained did not solve the question of the fundamental cause of the embrittlement, but did point out a convenient and simple method for eliminating it.

A competitive examination for an assistant electrical engineer to fill a vacancy in the Quartermaster Corps of the Army, Philippine Islands, has been announced by the United States Civil Service Commissary, Washington, from which application blanks may be obtained until Jan. 15.

Foreign Trade for American Steel

President Farrell and Government Officials Address Conference in Cleveland—Demand from Japan an Important Factor

JAMES A. FARRELL, president of the United States Steel Corporation and chairman of the National Federal Trade Council, and seven division heads of the Department of Commerce were speakers, Dec. 12, at the third foreign trade conference that has taken place in Cleveland during the past year under the auspices of the Cleveland Chamber of Commerce. The meeting was of particular interest to manufacturers in view of the fact that the principal topic of discussion was conditions in Japan and the outlook for American trade in that country, growing out of the demands for material for restoration work necessitated by the earthquake. However, European conditions both in respect to the outlet for American goods in Europe and to European competition in Japan, were dwelt on to some extent.

Mr. Farrell said that American manufacturers must go ahead with the work of developing foreign markets and with existing conditions in Europe should turn their attention to opportunities in South America and the Orient. It is important, he declared, to make larger use of markets heretofore regarded as secondary and to sell goods in these to offset the decrease of exports to Europe. Even when Europe recovers there is no assurance that her interests will not be antagonistic to those of the United States. Permanent connections must be established in other markets and fields found for our surplus products to keep labor continuously employed. Heretofore the study of foreign trade has not been given the attention that it deserves. He said that German manufacturers now have the advantage over other producers because they have been able to eliminate overhead by paying off their indebtedness with the depreciated mark.

Distribution Problems Neglected

American manufacturers, Mr. Farrell declared, have developed the most wonderful production methods in the world, but they have neglected the problem of distribution, including transportation and financing. He urged the need of a strong American merchant marine. In this connection, he said that three years ago the Government adopted the policy of doing everything necessary to maintain a merchant fleet under private ownership and operation, the purpose being to transfer the Government owned fleet to private ownership. Although progress has been made along that line, the proportion of goods carried in American vessels has been constantly decreasing while the proportion of privately owned vessels has been increasing. The efforts of the shipping board to secure cargoes has led to rate cutting which has forced the withdrawal of American vessels engaged in overseas trade but has not forced foreign competitors to lay up their ships. A system which compels American ship owners to operate at a loss is not conducive to the upbuilding of an American merchant marine. In his opinion there should be some relation between the freight rate and the value of the commodity carried, so that carriers would not suffer a loss.

President Farrell spoke at a luncheon which was largely attended by members of the chamber. Morning and afternoon sessions were attended by Cleveland and other Ohio manufacturers directly interested in the problems for foreign trade.

Japanese Demand for Building Materials

Luther Becker, chief of the Iron and Steel Division, Department of Commerce, talked about the Japanese market for building materials. He said that the cost of Japanese restoration would probably be paid for by Japan by spreading the work over a long period, although the Government may be compelled to make foreign loans to pay for some of the material. The Japanese program of restoration would probably take 15 to 20 years to carry out. Japan has purchased 300,000 tons of steel since the earthquake for private and Government accounts. The demand during the next few months will be largely for the lighter materials such as sheets and nails. The Japanese demand for steel will be very heavy for many years, but it will probably be a year before the permanent construction work is started, as much time will be required in solving the engineering and legal problems necessary before the rebuilding of Tokio and Yokohama into modern cities can be started. Several modern steel and concrete buildings withstood the earthquake with slight damage and probably these types of buildings will be adopted, with wood types for residences. Supplies in enormous quantities will be required for permanent construction work and most of these will have to come from outside of Japan.

The speaker said that the iron and steel products that will be needed will include bars, structural shapes, sheets, strip steel, wire rods, nails and wire shafting and piling. American steel is in favor in Japan and particularly our black, galvanized and electric sheets, nails, gas and water pipes. The Japanese insist on quality in steel and American mills need not fear Japanese competition. A large foreign supply of builders' hardware will be required, although considerable is made locally. Some brass and copper products will also be needed. With the construction of better houses the speaker predicted a wider use of electrical appliances.

Mr. Becker said that the Japanese demand will probably start in the spring and urged American manufacturers to begin sales campaigns without delay. This is already being done by England and Germany. A few American consumers, he said, are well represented in Japan at present by their own organizations or Japanese import houses, and he urged others to have representatives in the field either their own men or by making connections with smaller Japanese importers. He suggested that American manufacturers in noncompetitive lines might pool their interests and send sales experts to Japan. The speaker declared that the financial condition of Japan is sound and that the Japanese plan to pay for reconstruction work out of their own resources.

The Machinery Outlook

W. H. Rastall, chief of the Industrial Machinery Division, Department of Commerce, discussed the Japanese market for miscellaneous machinery. He referred to the fact that sales of American machinery in Japan last year exceeded that in any other country except Canada. He regarded Latin America as probably the best field at present in which to center efforts for sales of American machinery, but declared that the Asiatic group, particularly Japan, is attractive. He pointed out that the Japanese have come to like American machinery. Previous to the war, Germany had furnished 45 per cent of the machinery for international trade, but Germany has almost disappeared as a factor. This business formerly taken by Germany is now available to other countries and it is apparent that during the next few years the bulk of the international machinery business will fall into the hands of British and American manufacturers. If no effort is made, much of this business will go to England because of price. The speaker urged American machinery man-

ufacturers to be properly represented in foreign markets so that buyers will be taught to give quality proper consideration, preventing them from buying solely on a price basis. Mr. Rastall said that it would be hard to estimate the amount of machinery that will be required in the various stages of rebuilding operations in Japan, but pneumatic tools and air compressors would be needed in the construction work. He regarded Japan as a market of tremendous importance for machinery manufacturers and declared that they should arrange to be represented there for an indefinite period rather than for the period during which reconstruction work is going on.

Get Salesmen in Japan

Arthur Hillyer, chief of the Commerce Intelligence Division, Department of Commerce, said that in selecting sales representatives in Japan the best plan would be to go there and pick out the best available material. Adaptability and service are more important than price and he urged on American manufacturers the importance of keeping spare parts of machinery on hand in Japan for replacements. Mr. Hillyer spoke in favor of such combinations of American and Japanese manufacturers as have been made by the General Electric Co. and within the past week or two by Westinghouse interests and Japanese electrical interests.

Alan T. Goldsmith, chief of the Western European Division, said that Germany is out of the competition for foreign markets at present and will not be a factor for at least a few months because of the collapse of the mark and that the same is true to a less extent of France because of the decline of the franc. Our most severe competition will come from England, which has long had a strong foothold in Japan. The United States has made remarkable progress in developing the Japanese trade, but the British are now trying to get back their pre-war position. He urged American firms to use American instead of European representatives.

Many Inhibitions of Acts by Association

Attorney General Daugherty Discusses Consent Decree as a Definite Code of Business Ethics

WASHINGTON, Dec. 18.—The consent decree entered on Thursday of last week by Federal Judge Knox at New York, dissolving the Cement Manufacturers' Protective Association, charged with operating in violation of the Sherman anti-trust law, has been significantly commented upon by the Department of Justice. It is far reaching in its efforts to be clarifying regarding the activities of trade associations throughout the United States. Expression of this view was made in a statement issued by Attorney General Harry M. Daugherty. He declared that an earnest effort had been made to meet the demands of the business interests of the country for a decree which would be equitable and fair in all respects.

The decree by Judge Knox embodies, Mr. Daugherty stated, the most comprehensive and definite code of business ethics which has been laid down in any case arising under the Sherman act during the period of 33 years that act has been on the statute books. There are several thousand trade associations in the United States, the principal functions of which are to collect and disseminate statistical data with respect to every detail of their business, it was pointed out. The membership of those associations comprise many thousand corporations engaged in practically every line of business. And the terms of Judge Knox's decree, said the Attorney General, will be of vital interest to every member of a trade association. He added:

"Just as the Standard Oil and Tobacco cases are recognized as landmarks in the law with respect to combinations brought about by consolidation, so will the cement case decree serve as a guiding principle by which trade associations and the members thereof must be governed in their future activities.

"The cement case has been the subject of a long and hard fought contest in the United States Court at New York for more than two years." An opinion was handed down by Judge Knox on Oct. 23, 1923, and the decree entered today (Dec. 13) is in conformity with the law and facts as laid down by that court."

The consent decree entered in the cement case is strikingly similar to the consent decree of the Federal District Court of southern Ohio at Columbus, ordering the dissolution of the Tile Manufacturers' Credit Association. While there is a difference of opinion among business interests themselves as to the effect of these two decisions, some prominent attorneys who have studied them declare that they are of a sweeping and restrictive character that deprives trade associations of a vast amount of construction work, including the gathering of vital statistics except at Government request only.

The decree of Judge Knox prohibits the following association activities, but does not apply to any of the defendant companies individually:

Reports by members to the association giving details of specific job contracts, showing name of dealer, name of contractor, description of work, quantity sold, the price, quantity delivered to date and balance to be shipped;

Reports by members to the association of changes in specific job contracts, i.e., increases, decreases and cancellations of quantities previously reported;

Daily reports by the association to its members summarizing the details of all specific job contracts filed with all members;

Reports by members requesting further information about contracts taken by other members;

Reports by checkers or inspectors giving the results of investigations of contracts about which information is desired;

Reports by the association to its members submitting checkers' reports on contracts under investigation;

Reports by members expressing satisfaction with checkers' reports or requesting further investigation and pointing out possible discrepancies;

Monthly reports by members to the association giving information in detail as to the status of all contracts;

Monthly reports by the association to its members giving information in detail as to the status of contracts of all members;

Quarterly reports by the association giving the status of all specific job contracts on file with members, showing names of dealers, names of contractors, description of work, quantity sold, the price, quantity delivered to date, quantity canceled, and balance to be shipped;

Reports by members to the association showing number of bags returned, the number accepted, and the number rejected;

Reports by the association to its members summarizing data concerning bags returned, accepted and rejected.

The decree also prohibits the association from canceling actual contracts which may exceed actual requirements of specific construction work or which are duplicate contracts held by other manufacturers for cement intended for the same construction work, and also prohibits collection and distribution among manufacturers of cement information with reference to such contracts.

The association was also enjoined from making, receiving or distributing reports of the following character:

Reports by members to the association giving the quantity of clinker burned, cement ground, cement shipped, clinker in stock, and cement in stock;

Reports by the association to its members showing as to each member the quantity of clinker burned, cement ground, cement shipped, clinker in stock and cement in stock;

Reports by members to the association giving total shipments during a specified period of time;

Reports by the association to its members showing shipments by each member during a specified previous period of time.

As in the tile case decision, the decree entered by Judge Knox prohibits the collection and distribution of freight rate books from any arbitrarily established freight basing point to the points of delivery throughout the territory comprising the market, but does not prohibit the furnishing of rates or rules of transportation showing actual rates between points of shipment and delivery, although there is an inhibition against basing rates on any points other than those of actual shipment and delivery.

Another permissive clause in the decision allows the maintenance of the Credit Bureau for the sole purpose of furnishing information as to the credit of persons buying or attempting to buy cement, but the decree does prohibit agreeing to refuse to make sales to particular customers or from agreeing upon other conditions excluding customers from being extended credit.

Interestingly enough, in view of the principles involved in the Pittsburgh base case now before the Federal Trade Commission, the decree of Judge Knox prohibits the establishing of mill base prices for cement and the selling of the product f.o.b. point of delivery exclusively. A similar provision was carried in the tile decree. Other practices prohibited follow:

To limit the quantity of cement to be shipped to a dealer within a specified period of time;

To prohibit the diversion or so-called misuse of cement sold on specific job contracts;

To establish and maintain a uniform differential in the price of cement sold to dealers and contractors;

To fix or suggest the amount of commission or profit dealers should be required to make in sales of cement;

To regulate or limit the amount of production of cement, and/or the amount of stock to be kept on hand;

To limit the time within which quotations on cement must be accepted and deliveries made, and to refuse to grant extensions in time of deliveries;

To make changes in prices effective as of the date quotations are written, to avoid "price tipping";

To guarantee prices against decline;

To make uniform charges for bin tests, and/or to require the purchaser to pay for such tests.

Poor Prospect for German Steel Industry

Commercial Attaché Herring Says Competition from the Teutons Not Likely to Be Serious in Near Future

WASHINGTON, Dec. 18.—Pending a settlement of the Ruhr question it is probable that the competitive ability of the German steel industry will be less than at any time in its history, THE IRON AGE was told by Commercial Attaché C. E. Herring, assigned to the Berlin office of the Department of Commerce. Mr. Herring recently returned to the United States for a brief period during which he is taking up official matters with the department.

The inability of the German steel industry to reenter world markets on its former scale in the near future will be particularly marked, Mr. Herring said, if the French, in order to provide reparation funds or for other purposes, decide to enforce special export or import duties, coal taxes, or other forms of taxation in industry and if the existing customs barrier between occupied and unoccupied Germany is continued. The coal, coke and metallurgical production of the Ruhr and the finishing industries and food-providing regions of unoccupied Germany, the commercial attaché pointed out, constitute a natural economic unit whose sudden separation is likely to mean depression, higher production costs and general inefficiency.

Since passive resistance in the Ruhr was abandoned —at least up to about four weeks ago, when Mr. Herring left Germany—and presumably up to the present, he declared practically no progress had been made in restoring pig iron, steel and allied production. The machinery and other metal-finishing plants were in slightly better position, as in some cases limited supplies of semi-finished materials were still available.

"Failure to resume production and export immediately after passive resistance was given up," said Mr. Herring, "was caused by the almost complete paralysis of transport, the continuing embargoes, delay in reinstating the German railway personnel in the Ruhr and the consequent virtual cessation of coal and coke movement. Other obstacles were uncertainty as to the terms upon which the French would permit resumption of production by individual plants, as to how and when the coal and other taxes due were to be paid, how coal and coke deliveries on reparations account were to be resumed, and finally how great a degree of financial control the German industrialists would have over their plants under the final terms of the French.

"All these factors, for weeks after passive resistance was abandoned, combined to make permanent almost complete stagnation in heavy industry. For instance, on Nov. 1 it was estimated that, even with the reinstatement of German railroad workers, it would be at least three months before the intricate network of railroads in the Ruhr district would be able to transport the minimum necessary quantities of coal and coke, foodstuffs and essential raw materials. This estimate did not take into account any of the financial or political difficulties involved in restoring normal traffic, but considered simply the technical obstacles to be overcome. These were chiefly the great deterioration of rolling stock, particularly locomotives, the disorganization of the repair shops in the Ruhr, the damage to yard equipment, etc.

"Before the Ruhr occupation the German steel industry was in a rather precarious position. Like the rest of German industry, its activity, with practically no unemployment, was based largely on currency inflation, which gave a fictitious prosperity. The Ruhr occupation hastened the end of the long period of currency inflation and also, of course, resulted in an immediate decrease of production in the Ruhr and in embarrassment to the steel finishing industries of unoccupied Germany. With the bursting of the inflation bubble and the continued fuel shortage, German steel prices have tended to exceed world levels and there is little prospect of their reduction.

"At one time it was believed that the long cessation of steel exports from the Ruhr, due to the embargo and other incidents of the occupation, would result in heavy dumping when passive resistance was abandoned and in embarrassment to our own export trade. Long before passive resistance was given up it became apparent, however, that the great reduction in normal output, due to transport paralysis and other causes, and the volume of prior orders which could not be filled after the embargo became effective in January of this year, would greatly limit the stocks available for dumping abroad. The possibility of dumping and breaking world prices has been further discounted by the lien which the occupation authorities have maintained on finished steel stocks pending the settlement of tax, coal delivery and other questions."

LOWER TAXES DEMANDED

Business Men and Others Are Being Heard from at Washington

WASHINGTON, Dec. 18.—Widespread interest over the country in the taxation program of Congress is having the effect of the Ways and Means Committee to expedite plans for considering the program. Demand is becoming even more insistent from business and other taxpayers for reduction in their taxes and it has been spurred a great deal by the comprehensive program of the Treasury Department set forth by Secretary Mellon in a letter on Nov. 10 to Acting Chairman Green of the Ways and Means Committee. The reaction to the program has been remarkably favorable, and despite criticism from radicals in Congress and their efforts to frustrate the treasury program, the belief is growing that at least a portion of it will be adopted either in the exact form in which it was framed or in many of its essential features as they relate to reduction of normal taxes. The fight against reducing surtaxes, however, has considerable force back of it, while that to restore excess profits taxes is less formidable. The discouraging element continues to be the question of bonus legislation. Should it be enacted, as proponents of the bonus say it can be, even over a Presidential veto, it is the view of Administration officials that it would offset advantages that would arise from reduced taxes because it would entail a large sum for both the creation of a sinking fund, as is required by law, and the payment of interest. Treasury officials have insisted that reduction in taxes and enactment of a cash bonus bill would be an anomaly.

While the Ways and Means Committee will begin work at once on a taxation program, neither legislation in this direction nor plans for and against bonus legislation will be seriously taken up until shortly after the Christmas holidays, by which time it is expected that the Senate will have become organized.

With a view to expediting the work of the Ways and Means Committee in revising taxes, Secretary of the Treasury Mellon made public yesterday a letter to Acting Chairman Green setting forth the changes proposed in the tax program, as outlined in the Treasury bill just drafted, and the revenue act of 1921.

Large Shipment of Steel from Pittsburgh by River

The seventeenth and largest shipment of manufactured steel in barges down the Mississippi and Ohio Rivers from the works of the Jones & Laughlin Steel Corporation left Pittsburgh last week. The tow consisted of 15 steel barges, each containing about 800 tons, making a total of approximately 12,000 tons in the shipment. As there is a full stage of water the entire length of the Ohio and all the dams lowered, thus avoiding the delays incidental to passing through the locks, it is expected that the tow will get through to Cairo, Ill., the junction point of the Ohio with the Mississippi, a distance of nearly 1000 miles by river from Pittsburgh, in about six days. This is said to be less than the time by rail to the same destination.

The next similar movement from the Jones & Laughlin mills is scheduled to go out early in January, and it was stated by W. T. Mossman, who has general direction of this service, that it is the intention to operate throughout the winter, providing unusually severe weather conditions do not force suspension. Tows will be scheduled to depart regularly every month from now until June or July, when the low water conditions in the lower Ohio make it impossible to get loaded barges through to Cairo.

"All but five or six of the total of 52 dams and locks necessary to completely canalize the Ohio River from Pittsburgh to Cairo are now completed or under contract and rapidly nearing completion," Mr. Mossman says, "but unfortunately the few projects on which no work has begun are all on the stretch of bad river immediately above Cairo. In other words, full use of the Ohio as a trunk line freight highway connecting with the broad and deep Mississippi and affording a through route to the Gulf is impossible so long as even one of these projected dams in the lower Ohio remains unconstructed. If this waterways project was completed this country would have at its service an unequaled low-cost transportation facility, which properly used in conjunction, not in competition, with the railroads, would materially contribute toward the reduction of our national transportation expense and afford an added and very flexible distributing medium for the products of the mines, factories and farms in the vast territory drained by the great rivers in the Mississippi basin."

Agreement to Meet Short Supply of Men Declared Legal

WASHINGTON, Dec. 18.—The United States Supreme Court in a unanimous opinion delivered by Mr. Justice Holmes on Monday of last week, made brief comment in dismissing the case brought by the Department of Justice against the National Association of Window Glass Manufacturers, National Window Glass Workers, et al. The Department of Justice had obtained an injunction from the Federal District Court for the northern district of Ohio enjoining the glass manufacturers and workers, organized laborers, from carrying out wage agreements which provided for half time operation of the plants of the window glass manufacturers, producers of handmade glass. The action was brought under the Sherman act and charged restraint of trade in interstate commerce.

The dominant factor in this case, the court stated, is that in the last quarter of a century machine-made glass has been replacing handmade glass. The court declared that the defendants testified that the handmakers are able to keep on only by the sufferance of the others and by working longer hours.

Comment is made in the decision on the fact that there were not enough men to enable the hand blown plants to run continuously during the working season and that to work undermanned costs the same in fuel and overhead as to work fully manned, and therefore means a serious loss. "We see no combination in unreasonable restraint of trade in the arrangements made to meet the short supply of men," said the court.

The Ford Motor Co. has announced that construction work on the new assembling plant in Copenhagen, Denmark, is well under way and that the plant should be completed by the middle of next year. The site covers about 4½ acres and the estimated cost of the new plant is $650,000. The principal building will be 300 x 400 ft., two stories. This will be second only to the Manchester, England, plant in point of size of the Ford foreign plants.

The electric truck business is consistently growing, according to statistics collected by the Society for Electrical Development, Inc. In the first eleven months of this year 854 electric trucks have been sold. To the central stations of the country this means an off-peak load of approximately 5,200,000 kwhr. annually. In New York alone 438 electric trucks were sold during this period as compared with 326 during the first eleven months of 1922—an increase of 34 per cent. In Boston the sale of electric trucks has increased 76 per cent.

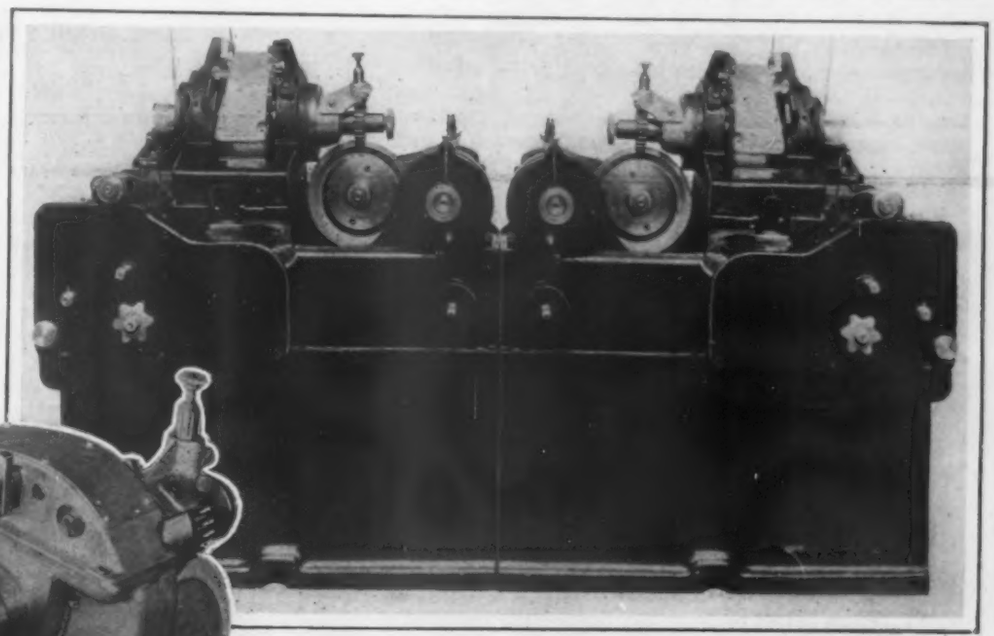
The slump in industrial buying is illustrated in the records of the sales of mechanical stokers. The total horsepower of stokers sold in November, according to statistics obtained throughout the year from 15 establishments by the Department of Commerce, was 16,241. This was substantially under the total number of October of 32,576 hp., and compares also with 60,486 hp. in September, and with 72,120 hp., the average of the first nine months.

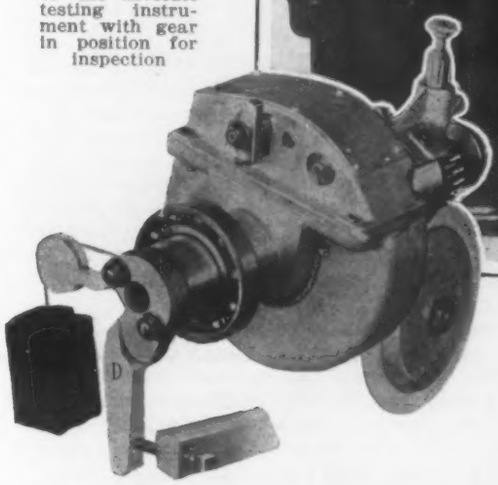
AUTOMATIC GEAR GRINDER

New Unit with Adjustable Involute Control—Separate Instrument for Detecting Errors

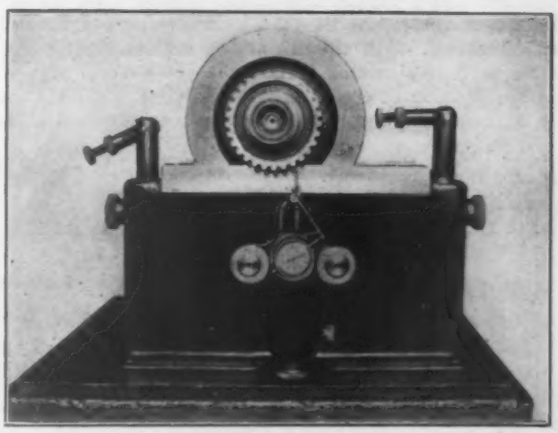
A full automatic involute gear grinder incorporating unusual features, together with a measuring instrument for detecting minute errors in finished gears, have been placed on the market by the Fellows Gear Shaper Co., Springfield, Vt.

It is recognized that in order to make material progress in the grinding of gear teeth, standards of known accuracy must be established and the means devised for keeping the work within those standards. In addition to a satisfactory involute grinder, which is only part of the problem, accurate reference gages must be provided for every size of gear to be ground and also measuring instruments for detecting minute errors in the finished product. The units offered, together with the reference gages, are therefore intended to provide complete equipment for the grinding of gear teeth.





Front View of Automatic Involute Gear Grinder, Showing Right- and Left-Hand Machines. A diagrammatic illustration of the rolling head, master involute tooth and its mating abutment, showing how these members are controlled, is below. The lower right-hand illustration is a front view of the involute testing instrument with gear in position for inspection



The grinder is entirely automatic in operation. After setting up the machine, the operator locates and clamps the gear on the work-spindle, and then pulls a lever. The machine then accomplishes the rolling action of the gear against the flat surface of the grinding wheel, indexes for each tooth, trues the flat face of the wheel, and stops automatically when the gear has been completed, whether one, two or more cuts are required.

It may be noted from the illustrations that the machine comprises a base carrying a grinding wheel head, which is adjustable for different gear diameters, and a slide carrying a member known as the "rolling head," the rolling action of which is controlled by a master involute tooth. Operating levers are at the front, and the base is made square to permit of setting machines end to end.

The principal member is the rolling head, which is of light weight, being made from a heat-treated aluminum alloy casting, and is carefully balanced to minimize the fly-wheel effect. It oscillates on ball-bearing supported trunnions mounted on the slide, the latter being moved backward and forward by a reduction-driven barrel cam. The rolling head contains the index mechanism and plate, and is designed so that indexing of the work may be accomplished without shock in 1/10 sec. On the outer end of the rolling head is the master tooth, which is a long involute gear tooth that makes contact with an adjustable abutment in the form of a long straight-sided rack tooth. The master involute tooth, which is ground on a special machine, can be made accurate to within 0.0001 in. Both the master involute tooth and its abutment, or master rack, are made of alloy steel, and are hardened and ground. The rolling contact of the master involute tooth with that of its abutment resembles the action of a gear tooth rolling on a rack.

A feature of this mechanism, and to which is largely attributed the successful operation of the machine, is the fine adjustment provided for the abutment, which controls the pressure angle of the involute tooth being ground. It is claimed that by this means it is possible to control the accuracy of the finished product and to bring it within very close tolerances of the reference gage standard adopted. In addition to providing for wear, this adjustment is said to permit of keeping the work under very close control.

The importance of retaining a constant pressure of the work against the grinding wheel has been recognized. With varying pressure the rolling action of the work against the wheel will not be positive and an inaccurately-shaped gear tooth will be produced. The rolling head being of light weight, and balanced and mounted on ball-bearing supported trunnions, comparatively little weight is required to move it. By this construction it is intended that any force applied by means of a weight will not be expended in overcoming friction but will exert positive and known pressure. The weighting is accomplished by fastening a wire cable to the rolling head, passing the cable over an idler, and on the free end attaching a weight. Re-

movable segments are provided so that the desired pressure of the master involute tooth against its abutment may be maintained. As there is no flexible mechanism between the operation of the master involute and its controlling abutment, control of the work against the grinding wheel is said to be positive.

The small diameter of the grinding wheel employed is emphasized as permitting of more compact design, reduction of vibration and greater uniformity in density of the abrasive wheel. The automatic wheel truing device is also a feature. Having determined the necessary amount of truing, the machine duplicates it automatically, a requirement, it is said, that few operators can be depended upon to fill. Wheel truing may be timed to occur after the gear has made one or more revolutions, as may be found desirable.

Recognition has been given by the makers to the general principle that in interchangeable manufacturing for accurate concentric work, the most vital bearing should be selected as a location point and the work located from this for all operations. For gear grinding, it is claimed, this practice is followed most effectively by making right- and left-hand machines for grinding both sides of the teeth. The machine is therefore made in pairs, as shown.

The use of removable rolling heads is also a feature intended to assure the production of concentric gears. It is claimed that by having the rolling heads interchangeable none of the vital members are affected in changing over from one gear to another. After removing the caps from the trunnions the entire rolling head and its auxiliary mechanism may be easily lifted out and replaced by another.

In grinding gears, a standard for angularity of involute is considered a prime necessity and it is emphasized that before progress can be made standards of accuracy must be established and reference gages made for each size of gear to be ground. Only in this way, it is claimed, is it possible to produce satisfactorily running gears. A ground gear may be perfect as to tooth spacing and true involute form, but if it is not conjugate to the same rack as a gear ground at a previous time on another machine, then it will not be satisfactory. Tolerances that fulfill the requirements of ordinary interchangeable work are not considered close enough, it being said that to be satisfactory involute curves must be kept within 0.0002 in. of an established standard.

Involute Measuring Instrument

The involute measuring machine for use in checking or comparing the gears ground with the established standard is shown in an accompanying illustration. It consists of two cylinders representing the base circle of the gear to be measured. Concentric with it, and held on an arbor, is the gear to be inspected. These cylinders are rolled on hardened and ground steel surfaces, and exactly in the same plane as these surfaces is a jewel contact point that bears against the involute surface of the tooth to be measured.

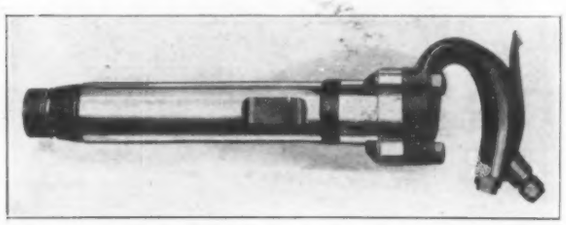
As the cylinders are rolled along the plane surfaces with the contact point bearing on the tooth, no movement of the indicator needle is visible if the curve is a perfect one. Any variations from the theoretically correct involute are by the multiplying lever and dial indicator measured in 0.0001 in.

Riveting Hammer with Improved Features

The Ingersoll-Rand Co., New York, is offering a pneumatic riveting hammer with improved features which include bolted construction for holding the handle to the barrel, heavy section valve with liberal bearing surface, and a poppet and piston type throttle valve.

Three styles, A, B and C, are available in a range of sizes from 5 to a 9 in. stroke. Each size is available with any one of three types of barrels and with either outside or inside trigger handles. The standard A type has a barrel machined to accommodate a rivet set clip only.

In this design three alloy steel bolts fitted with lock



Bolted Handle Construction, Heavy Section Valve and Combination Poppet and Piston Type Throttle Valve Are Features

washers hold the handle to the barrel, a construction intended to enable them to be taken apart anywhere for inspection or cleaning, with the aid of only a wrench. The throttle valve, except on inside trigger handles, is a combination of the piston and poppet types, and is said to have the nicety of control of the piston valve and the freedom from leakage of the poppet type. The throttle lever or trigger is made in one piece from heat-treated spring steel and has a long bearing in the handle. The valve is a strong sleeve made from special alloy steel, has liberal bearing surfaces and its walls are free from holes or ports. It operates in a valve box located in the head of the barrel. The valve box is constructed with a solid end, which permits taking it apart by the use of a piston, for the removal of the valve, without the use of a screw driver or similar tool. This gives a compression chamber in the valve box which cushions the piston on the return stroke and prevents it from striking the handle.

The handles are drop forgings of steel, shaped to fit the hand. Either outside or inside trigger handles may be provided, although the outside type is standard. The exhaust is through the side of the barrel near the handle and can be deflected in any direction merely by turning the deflector.

The hammers are said to have less "kick-back" than usual and consume less air. Largely because of the bolted handle construction they are said to be lighter in the handle end and consequently better balanced and easier to hold, especially when used in a horizontal or inverted position. The weight of the hammer, without set, ranges from 18½ to 24 lb., and the length, exclusive of set, 16½ to 21½ in.

May Build a Plant at Shadeland, Pa.

PITTSBURGH, Dec. 17.—Much interest has been aroused by a recent newspaper story stating that Pittsburgh and Canadian interests had taken options on 2000 acres of land in Shadeland, near Erie, Pa., on which was to be erected a steel plant. Apparently it will not be possible to satisfy the curious until after the turn of the new year, as J. A. Bradley, the Bradley Co., Jones Law Building, Pittsburgh, which firm has the contract for the construction of the new plant, says that the interested parties will not be in Pittsburgh until after the Yuletide holidays, and that actual work of building the plant will not begin until spring.

Mr. Bradley said that the company back of the project was already chartered under Pennsylvania laws with a capital of $50,000,000 and that those interested represented capital of $250,000,000, but refused to give the name of the company or the identity of those back of it. He did admit that the company would make steel direct from ore and at the outset would produce sheet bars, later adding billet, bar, sheet, rail, shape and plate mills.

A portable electric recording instrument has been developed by the Westinghouse Electric & Mfg. Co. It is known as type R and includes an electric self-winding clock for giving records at speeds up to 24 in. per hour. For slower speeds, up to 4 in. per hour, a hand wound clock can be used.

Economical Use of Fuel in Steel Plants

Discussion of Possible Savings Amounting to More Than $40,000,000 Annually—Good Design, Construction and Operation Demanded

BY H. E. SEIBERT*

AMONG present economic problems none is more important than that of fuel supply and demand, none that requires more attention from both industrial and domestic consumers, who in recent years have had to face shortages in supply and great increases in price. Only fifteen years ago some steel plants in the Pittsburgh district paid less than 10c. per M. cu. ft. for the ideal fuel—natural gas, the supply of which seemed to be inexhaustible and little more than $1.25 per ton for the best bituminous coal delivered at gas producer or boiler house bunkers. Today these plants cannot obtain natural gas at any price because the remaining supply must be conserved for domestic use, and they must pay $3.75 or more per ton for bituminous coal of inferior quality.

Plants outside the Pittsburgh district are affected more severely by the changed conditions, for their fuel costs considerably more. As these conditions were brought about in the last few years, it seems logical to assume that in the future a greater price will be exacted for coal of a still lower quality. The need for economy is therefore evident.

Consumption of bituminous coal for the years 1917 to 1921 was given by "Mineral Resources" of 1921 as in Table I.

Table I—Bituminous Coal Consumed in the United States

1917	552,000,000 net tons
1918	580,000,000 net tons
1919	446,000,000 net tons
1920	563,000,000 net tons
1921	407,000,000 net tons

For a good business year the rate of consumption is given as 550 million net tons, which probably will cover the consumption for 1923. This coal is distributed among the various consumers as shown by Table II.

Table II—Distribution of Coal Consumption

	Per Cent	Million Tons
Steel Plants	6.4	35.2
Bee-hive coke plants	6.5	35.8
By-product coke plants	8.7	48.0
Steel industry, total	21.6	119.0
Industries, other than steel and coke	25.0	137.5
Railroads	28.0	154.0
Electric power plants	5.7	31.4
Gas plants	0.9	4.8
Domestic consumers	10.0	55.0
Coal mines	2.0	11.0
Export	3.0	16.5
Seaborne	2.0	11.0
Foreign trade	1.0	5.5
Coast and lake steamers	0.8	4.3
Total	100.0	550.0

From the figures in Table II it will be seen that about 85 per cent of the total bituminous coal mined is used by four consumers: railroads, manufacturing plants, steel plants and domestic consumers. The yearly quantity involved is 466 million net tons. The steel industry alone consumes 21.6 per cent of the total bituminous coal mined, or 106 million gross tons per year. Economy effected in its fuel consuming equipment will therefore bear on a large proportion of the total coal mined. Thus a 10 per cent improvement in economy will net a saving in coal of 10 million tons per year, valued on a most conservative estimate at $40,000,000. The magnitude of the sum involved claims most serious thought of men responsible for the operation of steel plants.

Such a saving may be realized without undue difficulty, by improving the principal fuel consuming equipment. I shall endeavor to show this by presenting data in the form of heat balances and fuel rates for the principal primary and auxiliary fuel consuming equipment employed in steel plants. On the basis of these data, discussion will be presented on thermal efficiency, the principal heat losses, and on the means by which improvements may be effected.

Fuel Economy in Bee-Hive Ovens

Table II shows that we still use the bee-hive oven to a considerable extent: 36 million tons, or 43 per cent of the total coal coked, is carbonized by this old process, which wastes practically 30 per cent of its fuel input. Thus about 7 million tons of good fuel is lost annually in this method of coking. This quantity would be saved if all the coal coked were carbonized in modern by-product ovens, whose loss is about 10 per cent only. The value of the fuel is at least $30,000,000.

Most of the bee-hive ovens in operation today are not located in the vicinity of steel plants, but at or near the coal mines, in more or less isolated localities which offer little or no market for liquid or gaseous by-products. But this fact does not preclude piping gas—the most valuable by-product—to distant mills, where an additional 6 million tons of coal would be saved by the use of coke-oven gas, the surplus of which, on the basis of 6000 cu. ft. per ton of coal, would be sufficient to melt many tons of steel. Or the heat energy in the gas could be converted into electric current at the ovens and either distributed to the mills or tied in with public service power plants.

Fuel Economy in By-Product Coke Ovens

About 18 per cent of the heat in the coal is made available by the by-product coke plant in the form of liquid and gaseous by-products which are useful for steel melting and heating operations, for power generation, for municipal gas supply, or for distillation into other by-products, such as ammonium sulphate, benzol, toluol, etc. But only 57 per cent of the total coke produced at present is carbonized in efficient apparatus.

[Test data and heat balances applied to the operation of modern by-product ovens are then given by the author.]

Relation of the Blast Furnace to Fuel Economy

While the blast furnace is the largest consumer of fuel, it also is the producer of a valuable by-product—blast-furnace gas—in which is present 50 per cent or more of the heat value of the coke entering the furnace. In a good business year our production of pig iron amounts to 37 million gross tons. With a fuel rate of 2100 lb. per gross ton of iron, the coke required is 35 million tons, and the coal necessary to produce this coke is abolt 50 million tons.

Taking a net heat value of 12,800 B.t.u. per lb. of coke, and 50 per cent of this heat as available in the form of blast-furnace gas, we get, on the basis of 13,000 B.t.u. per lb. of coal, the fuel equivalent of 17.3 million tons of coal per year. Assuming a high figure for the fuel required for heating the blast (one-third) the remaining 11.5 million tons is available for general power purposes. This amount would generate nearly one-half of the electric power produced in this country, on the basis of present steam power plant requirement for coal.

Thus the blast furnace is a huge gas producer of high efficiency. The economy which may be derived from the use of blast-furnace gas depends upon the type of equipment. The factor of primary influence

*Combustion engineer Bethlehem Steel Co., Bethlehem, Pa. This is abstract of a paper read at Buffalo, before the Association of Iron and Steel Electrical Engineers.

is the hot blast stove, which may require 15 per cent or 50 per cent of the total gas, depending upon the amount of its heating surface, the type of burner equipment, the means of control, the fineness of gas cleaning and other details. Another important factor is the type of blowing and other power equipment. Thus, more power and more surplus gas will be available for the steel plant if gas engines be used for power and for blowing purposes.

Data were then given drawn from papers before the American Institute of Mining Engineers, in 1915 and 1917 and before the American Iron and Steel Institute in 1915—all relating to blast furnace practice with Mesabi ores.

Gas and Air Volume Constant

From the data given the volumes of gas and air per unit of carbon were found practically independent of the character of the furnace burden. The sum of $CO_2 + CO + CH_4$ varied within very narrow limits, notwithstanding the wide range in coke per ton of iron—1584 lb. to 5800 lb. While there was a great difference in the percentage of CO_2 and CO per cu. ft. of gas, due to different fuel rates, the sum of the carbonaceous gases remained practically constant. The quantity of heat present in the top gases, of course, increased with the increase in the furnace fuel rate. Thus, for the coke rate of 1584-lb. the calorific value of the dry gases was 47.3 per cent, while for the 5800-lb. coke rate the gases contained 66.9 per cent of the heat value of the coke. The air volume passing the tuyeres per unit of carbon also may be considered constant.

From the heat balances and from the data, it can be stated that for all heat calculations connected with the use of blast-furnace gas no appreciable error will have been made in assuming a gas volume of 70 cu. ft. at top of furnace, and air volume at the tuyeres of 52 cu. ft., per pound of coke charged into the burden. These figures which seem to hold for the given range in fuel rate, were applied in calculation on the power that can be produced from the gas of a modern blast furnace, based on careful tests of the auxiliary equipment and on monthly records of the operation of steam engine driven and gas engine driven plants.

Power at Varying Efficiencies

It was found that, with stoves and boilers at 80 per cent efficiency, the gas from a 500-ton furnace will permit generating steam at the rate of 5070 boiler hp., while at 50 per cent stove and boiler efficiency, the rate of steam production will be only 2540 hp. The lower extreme does not represent impractical operating conditions, as there are now in operation many good-sized plants whose average efficiency on stoves and boilers is less than 50 per cent. The upper extreme can be realized in practice if we design the stove and boiler equipment for the conditions of high efficiency, i. e., if we provide the proper amount of heating surface for the stoves, choose a good size and type of boiler, guard against excessive radiation losses, and if we provide these units with good burners and continuous control equipment.

Comparing the data developed, it was found that the gas engine plant should require but one-half the water necessary for operating the steam plant. It should also be noted that the gas engine plant is less dependent on the inlet water temperature, while a high vacuum demands cold water. These points have especial bearing in localities where water is scarce. The data show that the application of gas engines is favored by both fuel economy and water economy.

Installation Costs vs. Savings

One important question is that of installation cost. Now the investment required in a gas engine plant complete with gas cleaning and waste-heat steam plants is not much greater than that required for steam boilers and for steam blowing and power equipment. The gas plant will, therefore, effect a large saving in money as well as in fuel and in water.

Taking the yearly production of one blast furnace at 160,000 tons of pig iron, the saving which may be effected by a gas engine installation such as has been suggested is $1.55 per ton of iron. Expressed in terms of coal alone, the saving amounts to 28,800 gross tons per year, which, at $4 per ton, equals $115,000, or 72c. per ton of iron.

Conclusions

We can obtain a stove efficiency of 80 per cent and maintain it in practice. The same can be said of the boilers. But we cannot obtain or maintain these high efficiencies by simply connecting a gas flue with a piece of pipe and allowing the gas to roll into the stove or boiler, and then out of it into the atmosphere. High efficiency demands good equipment and the best of continuous control. We would not think of operating a steam engine without a governor, nor an electric generator without switchboard equipment, but we do operate, or try to operate, equally important equipment—stoves and boilers—without the equivalent of such devices. The sooner we realize the error of our methods the sooner will we be on the road to fuel economy.

Discussion

George R. McDermott, assistant chief engineer Illinois Steel Co., South Chicago, referred to the electric operation of the greater portion of his plant. There are 11 blast furnaces and electric power is derived from units driven by blast furnace gas as a fuel. It was found some time ago that there was a considerable excess of gas beyond that needed for the electric drive. Consequently, it was arranged to use some of this excess gas for the pipe mill reheating furnace, mixing it with producer gas in the proportion of 60 per cent producer gas and 40 per cent blast furnace gas. As this did not use all the surplus from the furnaces, six plate mill furnaces were similarly equipped for using mixed gas. As there was still a surplus, two open-hearth furnaces of the tilting type, of 200 tons capacity each, were arranged to burn a gas consisting of 50 per cent blast furnace gas and 50 per cent tar from the by-product coke ovens. The only change that has been noted in operation of these furnaces is that it takes a little longer to get out a heat.

Another use for the blast furnace gas is in connection with blowing the producers. It is mixed with the air, making a cycle of 6 min. on air and 2 min. on blast furnace gas, in place of using steam. This has resulted in no trouble from clinkering, the production of CO_2 going up to 35 per cent. Analysis of the gas shows a quality equal to that obtained by steam blowing. One advantage lies in the fact that the use of blast furnace gas avoids the water vapor inseparable from steam blowing and, consequently, helps the operation of the furnace using the gas.

Another speaker pointed out that the heat balances covered in the paper should be supplemented by economic balances, in order that the management may know how much it will cost to get the better heat balances shown. If the cost is too great for the benefit, it would be obviously of little value to incur the expense of installing the equipment to obtain this benefit.

Temperature Requirements of Hot Spot Manifolds

In a 44-page pamphlet of the Engineering Experiment Station of Purdue University have been gathered results of experiments with exhaust temperatures from gas and oil engines in an effort to effect good carburetion by the hot spot method. Considerations of approaching exhaustion of the natural petroleum resources of the country, together with the cost of operating the millions of gas engines now in use, have prompted the effort toward more economical operation. The hot spot manifold is expected to supply sufficient heat to produce even distribution and perfect combustion with the lowest possible mixture temperature.

The export of automobiles to Australia amounted to 18,504 for the first nine months of this year compared with 8055 for the same months of 1922 and 2231 for the corresponding period of 1921.

Professors Oppose Pittsburgh Basing

Economists Favor Making Mill Prices, Which They Declare Necessary to Establish a Real Market—Evidence Completed at Last

BY L. W. MOFFETT

WASHINGTON, Dec. 18.—Evidence in the Pittsburgh base hearing before Examiner J. W. Bennett of the Federal Trade Commission finally was completed last Saturday. The concluding testimony consisted of rebuttal evidence submitted by the commission under examination by its attorney, H. K. Steinhauer. It included statements by economists of Harvard and Princeton Universities and the University of Wisconsin, who appeared as representatives of legislatures of Middle Western States which some time ago adopted resolutions condemning the Pittsburgh plus practice, and instructed their attorneys general to submit evidence in opposition to the plan. The City of Chicago also filed a petition through Assistant Corporation Counsel Leon Hornstein in opposition to the system. The actual final evidence was in the nature of exhibits of freight rates, prices, etc., on steel put into the record by H. E. White, statistician of the commission. It is believed it will be at least six months before the commission decides the case.

The three university economists included Prof. Frank A. Fetter of Princeton, Prof. William Z. Ripley of Harvard and Prof. John R. Commons of the University of Wisconsin, who testified in the order named. Their testimony was largely of a similar character and showed that these economists were in favor of f.o.b. mill basing points.

History of Pittsburgh Base Case

Aug. 1, 1919—Application for complaint filed with Federal Trade Commission by Western Association of Rolled Steel Consumers, followed by application from numerous other organizations.

Dec. 2, 1919—Preliminary hearing begun at Washington before commission.

July 24, 1920—Commission denies application for complaint, Messrs. Murdock, Colver and Gaskill voting against its issuance, with Messrs. Thompson and Pollard voting for it.

Aug. 1, 1920—Rehearing asked for by H. G. Pickering, counsel for the Western Association of Rolled Steel Consumers.

Sept. 20, 1920—Rehearing granted. Those voting favorably were Messrs. Thompson, Colver and Pollard, and those opposed, Messrs. Murdock and Gaskill.

Nov. 15-17, 1920—Rehearing held.

Dec. 6-9, 1920—Arguments made and application taken under advisement.

Aug. 30, 1921—Complaint against the Steel Corporation issued, charging Pittsburgh base practice constitutes unfair method of competition under Federal Trade Commission act and price discrimination under the Clayton anti-trust law. Those voting for the complaint were Messrs. Thompson, Pollard and Nugent, and those opposed were Messrs. Gaskill and Murdock. Mr. Pollard's term has expired and he has been succeeded by Judge V. W. Van Fleet.

Jan. 30, 1922—Hearings begun at Milwaukee.

Mar. 1-Nov. 1, 1922—Hearings at various points over the country, during which commission concluded direct testimony.

Jan. 19-July 17, 1923—Steel Corporation submits testimony at various points over the country.

Dec. 10, 1923—Steel Corporation completes its direct testimony and rebuttal begun by commission.

Professor Commons' Definitions

Professor Commons declared that a mill base price is necessary to constitute a real market. A delivered price, he contended, means an assemblage of two commodities, freight and steel, while the mill price would include only steel. The Pittsburgh base practice, he said, has a peculiar combination in that it involves both commodities and it results in concealing the price at other points because the freight is not known to the consumer. He conceded upon cross examination by Attorney C. A. Severance for the United States Steel Corporation that the freight rates being published are readily ascertainable, but still maintained this would not clearly afford knowledge of the actual base prices where such prices differ.

Disagrees with Judge Gary

Professor Commons said that within the past 20 years the largest corporations have adopted a policy of "Live and let live," and the weaker competitors have been protected in a sense by following the prices of the dominant producers. But this policy, he said, does not represent a truly competitive policy, although it does away with destructive competition.

Based on a question by Attorney Steinhauer as to whether he agreed with Chairman Elbert H. Gary of the Steel Corporation that the Pittsburgh plus plan can be operated only upon the basis of the law of supply and demand, Dr. Commons stated that in his opinion the practice is not built upon this economic structure.

"Sometimes prices are controlled," said Professor Commons, "and when the element of control enters into supply and demand the natural economic law cannot be set up as a justification."

It is because of the Pittsburgh plus system, he said, in referring to an exhibit offered at a previous hearing by the Steel Corporation, that steel naturally moves from the East to the West instead of from the West to the East. Supply means a quantity of goods offered at a given price and demand is the same thing and involves goods taken at that price, it was stated. A mere statement of production, said Professor Commons, throws no light on demand. Had the price been different, it was pointed out, then production would also have been different.

Professor Ripley, author of the plan to consolidate railroads of the country, said that it had been commonly expected that the Pittsburgh plus practice would disappear, so far as the Chicago district was concerned, when the Steel Corporation established its plants at Gary, Ind. Dr. Ripley was stressing the fact that a production center such as the Chicago district is entitled to the advantage of its location but maintained that such an advantage is not now given to that district.

"If the present plan of the Pittsburgh plus system persists," he declared, "it must be because of interference with the law of supply and demand. It creates a discrimination which results in the perpetuation of an outgrown system and thwarts free play of the economic law of supply and demand."

With application of the freight differentials, he claimed that the Chicago district would be given access to Western markets that under freely operated economic laws would shut out Pittsburgh mills at consuming points tributary to and west of Chicago.

The fighting ground between Chicago and Pittsburgh mills, Mr. Ripley said, naturally should be at a point midway between the two districts where the

freight rates became equalized. He said he was in substantial agreement with Professor Fetter that the Pittsburgh plus practice violates the law of supply and demand and, like Dr. Fetter, conceded that the Pittsburgh plus case will govern until the so-called point of saturation is reached. But the inference was that the Chicago district, for instance, now is of such proportions as to be able to meet demands made upon it.

Dr. Ripley said that he agreed with that portion of a speech made in Duluth, Minn., by Judge Gary, in which the latter said that it is natural for a mill first to develop markets nearest the source of production; after that the mills would engage in sharp competition unless it is restrained by unnatural forces, in the view of Professor Ripley.

During the cross examination, Dr. Ripley declared that from an economic viewpoint a base price with active competition will work itself out in any market territory by natural activities of producers seeking other markets by making price concessions outside the territory bounded by transportation costs.

Replying to a question relating to market practices as directly applied to the Pittsburgh plus plan, Dr. Ripley said he was not qualified to testify as a market authority but could discuss the question only on the basis of economic theory.

Popular Conception Wrong

The popular conception of price competition between markets is often wrong, Professor Fetter stated during cross-examination. The general theory, he declared, that competition means actual bidding between all producers of the same kind of products is utterly impossible. He expressed the opinion that base prices are arrived at as the result of buying and selling and should be controlled by the existing freight rates. Under present rates, he declared, market districts are able to annex certain territory clearly defined. Sellers then quote lower prices in order to widen the territory and this results in a twilight zone outside of the original market delivery, Dr. Fetter stated. At the same time, he declared that the cross freights resulting from shipments between territories must be borne by the public in the long run, if not at once.

Attorneys for the Steel Corporation asked Dr. Fetter for his view as to what actually was a free competition market, and he replied that there was not such a thing because all markets are subject to human imperfection.

British Pig Iron and Steel in November

LONDON, ENGLAND, Dec. 13 (*By Cable.*)—November pig iron production was 597,600 gross tons, comparing with 592,600 tons in October and with 714,200 tons in May, the year's highest. The output of steel ingots and castings in November was 749,500 tons, also larger than for October. It was the fourth largest month of the year, being exceeded by March, May and June.

Comparative production figures for the British steel industry in gross tons per month are as follows:

	Pig Iron	Steel Ingots and Castings
1913, per month	855,000	639,000
1920, per month	669,500	755,600
1921, per month	217,600	302,100
1922, per month	408,300	486,000
January, 1923	567,900	634,300
February	543,400	707,100
March	633,600	802,500
April	652,200	749,400
May	714,200	821,000
June	692,900	767,700
July	655,100	624,300
August	599,800	582,700
September	558,600	695,100
October	592,600	702,100
November	597,600	749,500

The pig iron average to Dec. 1, this year, is 618,900 tons per month and 712,300 tons per month was the average steel output.

Burning Fuel Oil in Railroad Locomotives

In a paper by J. M. Johnston, fuel agent, Missouri-Kansas-Texas Railroad, read Dec. 12 before the fourth annual meeting, American Petroleum Institute, at the Statler Hotel, St. Louis, the speaker referred to consideration of cost of coal and oil as follows:

Cost of Coal and Oil at Source

"Our experience shows that 3½ barrels of fuel oil, or 1088 lb., are equivalent to 2000 lb. of coal. The item of expense of coal and oil does not always depend upon whether the change from coal to oil should be made because the relative price of one ton of coal, fo.b. the mine, or its equivalent of 3½ barrels of fuel oil, f.o.b. the refinery, is the same.

"In making investigations for some railroads I found that the cost of coal at the mine was less than the cost of its equivalent of fuel oil at the refinery, yet, in the final analysis, the adoption of fuel oil created a saving on account of other economies.

Cost of Transportation—Coal and Oil

"In computing freight haul on either coal or oil from origin to point of consumption, tariff rates must govern when moved over foreign lines and actual cost of moving over home rails. That an amount of fuel oil capable of doing the same work as its equivalent in coal can be transported cheaper is illustrated by the following.

"We will assume that a railroad consumes 1,000,000 tons of coal annually, and the average mile hauled on home rails is the same for coal as for oil. Equating 3½ barrels of oil to one ton of coal, this consumption is equivalent to 3,500,000 barrels of fuel oil, or 543,900 tons. The net weight of a modern empty tank car is practically the same as the net weight of a modern coal car. On the basis of a net load of 50 tons to the coal car, it will require 20,000 cars to handle 1,000,000 tons of coal, while 14,700 tank cars of 10,000 gallons will handle this equivalent of oil. Therefore, when using oil fuel, a saving will be effected in the hauling of 456,100 net tons of company fuel annually, elimination of this extra haul being a large factor in reducing transportation expense."

Conference for Indiana Foundrymen

The engineering extension service of Purdue University announces the second annual conference of Indiana foundrymen, which is to be held at Purdue University, Lafayette, Ind., on Jan. 17 and 18. This conference will be of interest to manufacturers using foundry products as well as foundrymen. Effort is being made to secure men of national reputation along foundry lines to lead in the discussion of foundry problems.

A similar meeting held last year resulted in the formation of the Indiana Foundrymen's Association, and the first annual meeting of this association will be held in connection with this conference, which is in charge of W. A. Knapp, assistant director of the Purdue engineering extension service.

Employment in November

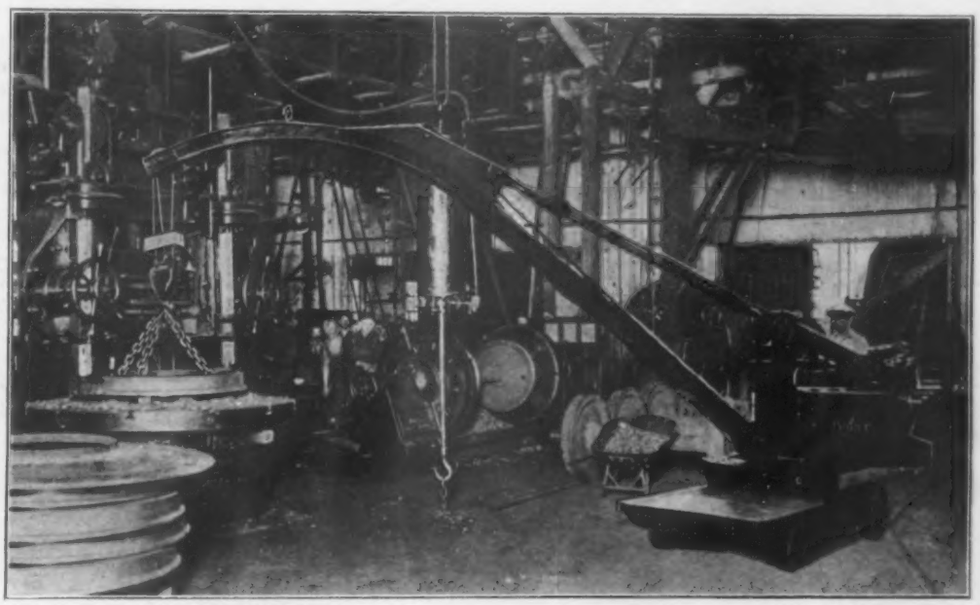
Seven of the 14 major industrial groups reporting to the Federal Employment Service at Washington showed increases in employment during November. Net declines in the 1428 firms reporting was one-half of 1 per cent of the total employed on Oct. 31. In the iron and steel and allied fields the decrease amounted to 2.85 per cent, in railroad repair shops the drop reached 2.35 per cent; and it was to these two factors—temporary curtailment of employment of most large railroad centers during November and brief suspension of activities in iron and steel and their finished products—which the survey holds responsible for the decrease. A slight lull in the activities of machine shops and foundries has created a surplus of semi-skilled workers in these lines, according to the survey, but the demand for unskilled labor is still greater than the supply.

Locomotive Crane for Industrial Use

The locomotive type crane illustrated, a recent addition to the line of the Baker R & L Co., Cleveland, is intended for duty such as lifting heavy members in erecting shops, picking up and carrying sheets, carrying and stacking pipe or bar stock, handling pig iron and scrap and similar uses.

A 12-ft. boom is standard but other lengths up to 19 ft. are available. The 19-ft. boom, which will reach over the top of a locomotive, may be employed in locomotive trimming work. It may be used to remove the front door or stack, hold an air pump in place while it is being bolted up and, equipped with the auxiliary boom, will work underneath the running board of a locomotive, handling side rods, springs, cross heads and other parts. With an 8-ft. boom and 60-in. wheel base the machine may be operated inside a standard box car.

Every motion of the crane is electrically driven and all controls are located on the dash directly in front of the operator. One motor propels the truck, another slews the crane and a third drives the main hoist. The machine has two-wheel drive and four-wheel steer. The rated capacity is 3000 lb. at 7-ft. radius, the travel speed with rated load being 3 miles per hr. and 4 miles per hr. without load. The hoisting speed of the hook, with rated load, is 7 ft. per min. and without load, 30 ft. per min. The slewing speed or time for 270 deg. travel at 7-ft. radius with rated load is 20 sec. and without load 15 sec. The weight of the unit equipped with 19-plate Ironclad battery is 7850 lb.



Locomotive Type Crane for Lifting and Transporting Heavy Parts. It is regularly equipped with a 12-ft. boom, but booms 8 ft. and 19 ft. long are also available, the 19-ft. boom being used in locomotive trimming work. All motions of the machine are electrically driven. One motor propels the truck, another slews the crane, and a third drives the main hoist

A feature of the machine is the main hoist, which is made up of two drums, both driven by the same motor through a pair of magnetically operated clutches. A solenoid brake prevents rotation except when power is applied and three limit switches are provided to control each operation. The machine has single reduction worm drive axle which is driven by a totally inclosed motor and equipped with duplex compensating suspension. The controller is of continuous torque drum type, with metal drum and reversible fingers. The automatic switch provided is of the quick break type with auxiliary carbon contacts. The brake is of external contracting type operating on the worm shaft and is interlocked with the automatic switch and controller.

The crane slews on ball thrust bearings and ball and bronze radial bearings. The slewing motor drives through a worm and spur gear reduction and is equipped with solenoid operating brake. Positive limit switches automatically control all motions of the crane.

The Inland Steel Co., Chicago, denies a report recently current to the effect that it had purchased the Hydraulic Steel Co., Cleveland.

Slight Decrease of Employment

WASHINGTON, Dec. 18.—A decrease in employment of 2.85 per cent was disclosed in iron and steel and other products in November, when compared with October, according to the monthly bulletin of the United States Employment Service, Department of Labor. Metal and metal products, other than iron and steel, showed an increase of 1.46 per cent; railroad repair shops showed a decrease of 1.38 per cent. The 1428 firms reporting showed a small reduction in the total number employed, amounting to 0.5 per cent, when compared with employment in October.

Commenting on the November decrease, Director General Francis I. Jones said: "Two of the outstanding factors responsible for this decrease were the temporary curtailment of employment in practically all large railroad centers during the month of November and the suspension for a short period of activities in the iron and steel and their finished products industry. It is encouraging to note that already large numbers of railroad shopmen have been returned to work, and that industrial employment conditions in the iron and steel industry are considered excellent notwithstanding the decrease noted."

Discussing the matter of seasonal occupations, Director General Jones pointed out that employment in seasonal occupations throughout the country continues on an exceptionally high scale for this period of the year.

Valuable Service of the Industrial Machinery Division

WASHINGTON, Dec. 18.—There has been a decided increase in the amount of routine work placed upon the Industrial Machinery Division of the Bureau of Foreign and Domestic Commerce, according to the annual report of Director Julius Klein, of the bureau. The chief of this division is Walter H. Rastall.

The total number of inquiries answered by the bureau with reference to machinery matters, during the fiscal year ended June 30, 1923, was 46,399.

A special survey has been made of the machinery dealers of the world by collecting reports showing the qualifications, facilities, and limitations of the dealers in all foreign cities. This material has been found of great value to machinery manufacturers visiting the division.

The division is arranging for the entire revision of the index showing the kinds of machinery produced by various American manufacturers, and it is expected that in the course of the next few months this index will be thoroughly revised and brought up to date.

MAKING FERROTUNGSTEN

French Experiments Using Scheelite and a Basic Lined Electric Furnace

An interesting account of experiments on the making of ferrotungsten, carried out in Russia by K. P. Grigorovitch in a small electric furnace specially built, appears in *Revue de Metallurgie* for March, 1923. Most work was done with scheelite from Japan containing WO_3 68.79, CaO 16.9, Mn 0.28, Fe 3.87, SiO_2 2.11, Mo 0.18, Sn traces, S 4.14, P 0.0 per cent. The first problem was the reduction of the high amount of sulphur, probably existing as FeS_2. Careful experiments showed that roasting at about 800 deg. C. was the best method, continued for about two hours, when the sulphur could be reduced to 0.7 per cent. This would produce a ferrotungsten that could be used satisfactorily for the manufacture of high-speed steel in the basic electric furnace, even if too high in sulphur for crucible practice.

A small tilting furnace was constructed, the bottom being made of crushed coke mixed with tar and a little resin rammed into place, and the walls of crushed magnesite mixed with tar. The use of basic instead of acid materials for the lining of the furnace is of essential importance. At the first glance it would seem that an acid lining should be used in order to diminish the loss of tungsten in the slag because WO_3 is acid in character. For this reason several experimenters use an acid lining. However with acid slags the loss of tungsten in the slags reaches 15 to 20 per cent or higher. Basic slags must be used because at the high furnace temperatures the WO_3 is reduced to WO and is basic in character.

The results of four experimental runs are then given. For the fourth the charge consisted of 24.6 kg. (54.2 lb.) calcined scheelite, 6.97 kg. (15.4 lb.) iron turnings, 4.30 kg. (9.5 lb.) charcoal, 4.51 kg. (9.94 lb.) sand and 0.41 kg. (0.9 lb.) lime. Special attention was paid to the complete reduction of the tungsten. Samples of slag were taken from time to time and lime or sand added as found necessary. Also reducing agents were added. Petroleum coke was found better than charcoal or ferrosilicon. The slag of the fourth test ran SiO_2 38.8, CaO 28.4, W 1.19, Fe 3.9, MgO 25.5 per cent.

The ferrotungsten formed in two layers, the upper one, containing only 49.8 per cent W, was fluid and poured readily from the furnace. The lower layer passed very quickly into a pasty state when the current was cut off, and contained about 75 per cent W. It could not be tapped from the furnace. In most cases this pasty mass is mechanically attached to the walls of the furnace. It is a question whether it is better to use power enough to fuse this pasty alloy and tap it from the furnace or to construct the furnace in such a way that it can be readily dismantled and the lump of alloy removed. G. B. W.

Effect of Severe Cold Rolling of Metals

As has been previously pointed out by the Bureau of Standards some rather striking and unexpected results have been obtained in connection with the bureau's study of the effect of severe cold rolling on metals. In brief, it has been found that when a metal is deformed by cold rolling it becomes harder, but if the cold deformation is continued without any intermediate annealing, the hardening process continues up to a maximum, after which a reversal occurs and the metal becomes progressively softer. The microstructural changes are also indicative. During the hardening the identity of the crystals can be detected readily, although they are distorted more and more by interior "slipping" within the crystals as the deformation increases. When all evidence of crystality, as judged by the appearance under the microscope, has disappeared, and the grains have been compressed into flat thin "scales," the hardening ceases and with still further deformation, softening occurs.

Additional work now in progress will include a study of the possible directional properties of the rolled sheets, that is, a determination of the hardness of the metal on sections perpendicular to the rolled surfaces as well as on the surface itself. The possible effect of the heat generated within the metal during the severe deformation and its relation to the hardening properties will also receive attention. The bureau plans to study the structural atomic changes of the very severely rolled metals by means of the X-ray crystallographic method as soon as the necessary apparatus is available for use.

Plans for Merging Belfont Iron Works and Kelly Nail & Iron Co.

Plans for the merger of the Belfont Iron Works Co. and the Kelly Nail & Iron Co., Ironton, Ohio, are now being worked out, following a meeting of the stockholders of both companies at Ironton Dec. 12. The stockholders will meet again Dec. 28 to discuss the terms of the merger, and if satisfactory, to ratify the deal. This merger has been contemplated for a long time, and it is said that plans following a successful termination of negotiations call for the erection of a rolling mill and open-hearth furnaces to supply the present wire and nail mills with rods. The Belfont Iron Works Co. is now operating the Belfont blast furnace, and has up-to-date wire and nail mills, the rods for which are being supplied by the Ashland Steel Co., at Ashland, Ky., in which the Belfont company is a stockholder. The Kelly company owns the Sarah furnace, and also has wire and nail mills at Ironton. Present capitalization of the Belfont Iron Works Co. is $2,000,000, while that of the Kelly Nail & Iron Co. is $1,600,000. S. G. Gilfillan is chairman of the board, and Coles Peebles president of the Belfont company, while I. P. Blanton is president of the Kelly company.

Advises Exporters to Go Slowly

W. H. Rastall, chief of the machinery division of the Department of Commerce, speaking at a meeting of the Cincinnati Chamber of Commerce, advised that exporters go slowly in the matter of granting credits to merchants in Mexico and Latin-American countries. He said there was an abundance of export business to be had in the world, and that business could be done in all countries, with the possible exception of Russia and China, with safety, provided there was a good assurance of credit for the goods before they left the United States.

Portland Cement a Record

Figures of the United States Geological Survey show the production of Portland cement in the first 11 months of this year to have been 126,969,000 bbl., which is more than 10 per cent above the 12 months' output of 1922, which was the highest record in the history of the industry. Shipments from the cement plants in the eleven months of this year likewise form a record, with 129,143,000 bbl., and are approximately 10 per cent above the twelve months' record shipments of last year.

From April to November inclusive the smallest production was over 11,000,000 bbl., while seven months in succession showed higher production than the highest month of any previous year. Each of the past nine months in succession has provided shipments exceeding 10,000,000 bbl.

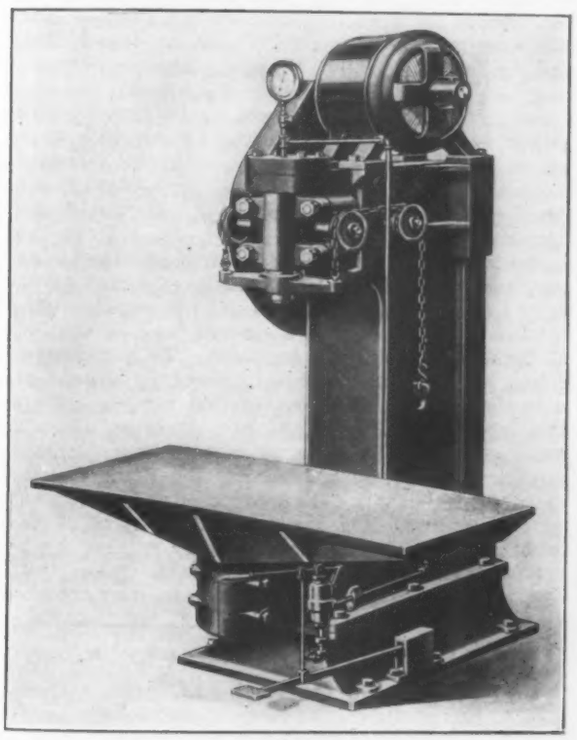
The Consolidated Machine Tool Corporation of America will sub-lease its store at the corner of West Washington Boulevard and Clinton Street, Chicago, and will rent office space elsewhere. For years it has been the custom of machine tool houses at Chicago to maintain showrooms in which machine tools are displayed for inspection by prospective customers. The Consolidated company is the first organization represented in that city to abandon a store in favor of an office.

New Straightening and Forcing Press

The hydraulic press illustrated, for use in bending, straightening or forcing operations has been placed on the market by the Watson-Stillman Co., New York. Two sizes are available, 30 and 50 tons, respectively. Although designed primarily for straightening cam shafts, crank shafts and automobile front axles, the press may be used for a variety of other work.

The machine is self-contained, requiring no auxiliary water or power supply, and is driven by a motor like any machine tool. It is quick acting and is under control of the operator, both as to speed and pressure, by means of a valve operated either by hand or foot lever. The pump is arranged so that the movement of the press ram through the idle portion of its stroke is rapid and the change from low to high pressure for the actual straightening operation is effected automatically.

An outstanding feature is the arrangement of the



Hydraulic Press for Straightening Crank Shafts, Cam Shafts, and Other Pieces. The entire table may be removed, leaving an open jaw forcing press for use in mandrel forcing, broaching, force fitting and assembling

table, which may be removed, leaving an open-jaw forcing press for other operations such as mandrel, forcing, broaching, force fitting and assembling.

Substantial construction is a feature and working parts are protected by removable dirt-proof guards. The frame is a steel casting with copper lined cylinder, bolted and keyed to the frame. The ram is of high carbon steel. The base is of cast iron and is built to serve as a reservoir for the pump. The pump body is bronze and the plungers are of hardened tool steel and are packed with hemp under bronze glands. The packings are easily accessible. The pump valves are made of Monel metal and are of the metallic seated type. The ram has a positive stop to prevent overstroke.

Hydraulic pressure is used only for the pressure or downward motion of the ram, the return being accomplished by means of a counterweight inside of the frame. The machine illustrated shows the press equipped with a slow-speed motor, with single reduction gearing to pump shaft. A high-speed motor may be used also, geared with compound gearing to the crank shaft. Spring type centers for holding the work to be straightened are available if required. These centers are adjustable for different lengths of work and also as to position on the table.

The following specifications are for the 30 and 50 ton machines, respectively; diameter of ram, 4½ and 5½ in.; stroke, 6 in.; gap, 10 and 12½ in. The speed of the ram is 120 and 98 in. per min. low pressure, and 28 and 24 in. high pressure. The distance from end of ram to table is 10 and 24 in. The table is 72 in. and 48 in. long, respectively. The weight of the larger press is 4750 lb.

Machine Adapted for Production Drilling

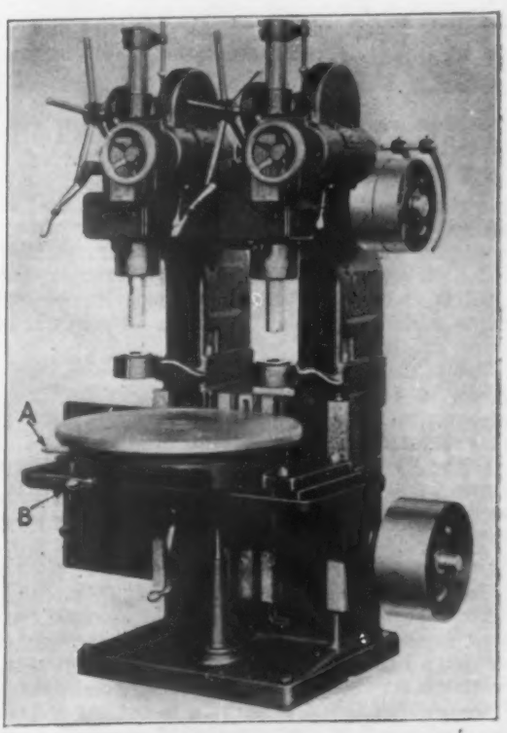
For the production drilling and reaming of cast iron bushings the Oakland Motor Car Co. is employing the special drill press illustrated herewith, which was built at the Colburn works of the Consolidated Machine Tool Corporation, Rochester.

The machine is made up of the Colburn standard two spindle No. 2 drill press equipped with steady supports and a special three-station rotating table. Two heads are mounted on a common column, which carries a bracket type of table extending the full length of the machine. The rotating table is clamped to the table of the machine and the three stations are for loading, drilling and reaming, respectively. The steady supports are provided for supporting the bar. The lever *A* is for releasing the indexing latch and the lever *B* is for clamping the table in position after it has been indexed. An automatic trip, together with spring type counterweights, returns the spindle automatically to the starting position after each operation.

A 5 hp. motor mounted on a bracket at the rear is geared to the jack shaft, and each head is driven by belt from this shaft. The heads are independent of each other and may be operated at different feeds and speeds.

The machine is intended as a production tool suitable for machining duplicate parts in quantities and is adapted for handling a large variety of work requiring a wide range of speeds and feeds. The patented transposing gear arrangement incorporated is claimed to permit of unusual flexibility and provide means for securing the correct speeds and feeds for the particular work in hand.

On work where two stations for drilling are required



Drill Press Equipped With Steady Supports and Special Three-Station Rotating Table for Production Drilling and Reaming of Cast Iron Bushings

a four-station rotating table may be used instead of three. The table would then be indexed 180 deg. to bring the work under the spindles.

Japan's Iron and Steel Industry—III*

Plant Extension During War Times—Production Figures Show Growth—Long Work-Day Beginning to Cause Uneasiness

BY DR. ING. E. KOTHNY

TABLE XIII gives a survey of the most important extensions contemplated during war times and how far these programs have been carried out to date. According to these figures the blast furnace plants in their present state are already sufficient to meet the maximum pig iron demand. The steel requirements, assuming a yield of 75 per cent of finished product from the ingot, can be met up to 70 per cent in the country. It is here presupposed that rolling mill capacity corresponds with ingot capacity. In the production of certain finished products, however, such as tin plate, wire and tubes, the capacity of existing Japanese plants is today less than 50 per cent of the market requirements.

Table XIII.—Plant Extensions—Proposed and Actually Completed

	Ultimate Capacity in Metric Tons			
	Pig Iron		Steel Ingots	
Name of Concern	Contemplated	Completed to Date	Contemplated	Completed to Date
Toyo Seitetsu K. K...	150,000	150,000	60,000	.....
Honkeiko — Manchuria	90,000	90,000	.....	.....
An-Shan Steelworks—Manchuria	1,000,000	150,000	1,000,000	.....
Imperial Steelworks...	750,000	450,000	750,000	600,000
Kamaishi Tessan.....	200,000	65,000	.....	25,000
Hokkaido Seitetsu K. K. & Nihon Seiko-jo K. K.	125,000	125,000	.....	80,000
Mitsubishi Seitetsu K. K.	100,000	100,000	250,000	50,000
Mitsubishi Shipbuilding Co.	.....	.....	35,000	35,000
Nihon Kokwan K. K..	.....	.....	150,000	150,000
Kobe Seiko-jo K. K...	.....	.....	50,000	50,000
Kawasaki Zosensho K. K.	.....	.....	150,000	150,000
Sumitomo Seiko-jo K. K.	.....	.....	90,000	90,000
Asano Seitetsu K. K..	Not Known	.....	Not Known	50,000
Osaka Seitetsu K. K..	Not Known	.....	50,000	50,000
Kyushu Seitetsu K. K.	Not Known	.....	50,000 buildg.	50,000
Other works	.....	.....	50,000	50,000
Total	2,415,000	1,170,000	2,735,000	1,430,000
Previous maximum consumption	1,069,000		2,064,000*	

*Figured from the consumption of finished products, assuming a yield of 75 per cent from ingot to finished product.

Table XIV contains data regarding the ingot production of Japanese steel works from 1917 to 1921, which prove that, so far, the capacity of steel plants has not yet fully been utilized.

Table XV gives a survey of blast furnaces, open-hearth furnaces, Bessemer converters, crucible furnaces and electric furnaces in Japan, Korea and Manchuria.

Stagnation

To the crisis in prices a market crisis has been added, especially lately. The slight demand for merchant ships—in the first half of this year only 30,000 tons have been built—and the disarmament plans for the navy, together with general economic conditions of the country, have materially decreased the demand for steel, so that, on account of market conditions, operations had to be curtailed greatly. This, of course, again increased production costs and made the Japanese steel industry unable to compete with foreign countries. It is difficult for the Japanese steel industry today, as before the war, to compete with foreign producers on account of high coal and ore prices, to which now must be added the higher wages.

Particularly blast furnace plants have to suffer competition from Chinese and Indian furnace plants, which today are shipping pig iron to Japan at prewar prices. Especially Indian works are offering pig iron very cheap. Today's pig iron prices mean only losses for Japanese plants, which consequently do not attach great value to production, since with today's prices it is more profitable not to produce anything. According to the latest news the Toyo, Honkeiko and An-Shan works contemplate for the present stopping operations altogether.

Hence the Japanese steel industry just now is passing through a crisis. Many plants expended all their profits during prosperity, and did not pay enough attention to the creation of a reserve fund, so that some of them are in a grave condition. To surmount this crisis, it is necessary first to make a general price reduction in Japan, similar to that already done and still being done in England and America. This will make possible a lowering of coal and ore prices and a reduction in wages. Second, the plants must be improved technically. On account of the higher wages which, even with a reduction of the cost of all other commodities to prewar levels, never will go back to prewar scale, an endeavor must be made in the Japanese steel industry to substitute mechanical devices as far as possible.

Measures for Relief

How the industry will outlive the present crisis is difficult to predict. The iron industrialists are endeavoring to influence the Government to eliminate the losses, either by increasing the import duty or by granting a direct subsidy to the various works, and thus facilitate the transposition of the industry to new conditions. During the war, in 1916, the duty on finished products had been changed. In place of a duty schedule by weight, a schedule by value was introduced, which for merchant steel, plates, wire, etc., and other rolled products amounted to 15 per cent of the value.

Table XIV.—Steel Ingot Production in Metric Tons

Year	Open-Hearth and Bessemer	Electric Steel	Crucible Steel	Other Steel	Total
1917.....	757,787	3,439	11,476	430	773,132
1918.....	798,048	4,329	8,830	2,012	813,219
1919.....	820,301	3,670	6,608	516	831,095
1920.....	838,344	4,230	1,751	708	845,036
1921.....	835,905	5,021	2,516	169	843,611

Since it is of greatest importance to the Japanese Government to maintain the vitality of its steel industry, it is to be expected that something will be done. The Japanese steel industry may be compared with the former Austro-Hungarian steel industry. Since the latter could exist with a not-excessive protective tariff, it can be expected that the Japanese steel industry can exist without excessive import duties if mechanically perfected and working under normal living conditions as to prices of commodities and wages.

Labor Problems Increasing

In all other countries the labor question is today of primary importance, but Japan is yet an agrarian

*Translated from *Stahl und Eisen* of June 14 and 21, 1923, by Paul Cebrat, Perin and Marshall, New York. The first section, dealing with pig iron and its raw material and with imports, appeared at page 1317 of our Nov. 15 issue. The second, detailing the slow early growth of the steel industry prior to the World War, was published on page 1591 of our Dec. 13 issue. This instalment completes the series.

country. Industrialization has made great strides, particularly in the last few years, but has not yet been energetic enough to make Japan an industrial country. Table XVI represents the number of workers employed in Japanese industries from 1914 to 1919, according to the Annual Economic Report of 1921. It also contains data regarding wages, number of working days in the year and working hours per day.

Considering the total population of 73,000,000, it is evident that the working class, numbering 1,600,000, of which almost 50 per cent are female, has no great influence in public life. The universal equal right to vote is yet unknown and the voting privilege depends on holding certain properties, or rather relates to certain taxation. Women are entirely excluded from voting. Japan's working classes have, therefore, no representation of their own in public bodies.

The Japanese workman, sober, intelligent and willing, has a lower efficiency than the European or American workman, and does not know closed organizations. Labor unions are legally not recognized and membership in a labor organization was, until a short time ago, cause for dismissal. Union representatives now are tolerated only in very few plants. In spite of the persecutions which the members of unions had to suffer, the spreading of unionism could not be prevented. The repeated wage wars of recent years, caused by increases in the cost of living, and the example of successes of labor organizations in other countries, contributed to the idea of organization here gaining more and more ground. Nevertheless, the movement is yet in its infancy.

The relation between superior and workman is in general good; socially the workman is considered equal. If, on account of scarcity of work, labor has to be discharged, the workman usually receives a compensation related to the duration of his employment.

The management of the Kobe steelworks issued about the middle of August, 1922, a notice to its employees, according to which in case of discharge on account of scarcity of work the following amounts would be paid:

> It is stipulated by law that workmen to be discharged must receive 14 days' advance notice. If discharged without notice, wages for 14 days must be paid.
>
> Besides this legally fixed amount, the company allows workmen, discharged on account of scarcity of work, the following compensations:
>
> After having been employed by the Kobe steelworks up to 6 months, 20 to 25 days' wages; over 6 months to one year, 25 to 30 days' wages. After one year, up to and including 4 years of employment with the Kobe steelworks, the compensation increases for each year of service by 10 days' wages. For the fifth and sixth year 15 days' wages for each will be paid. For service during this time, an additional bonus of 15 days' wages. For each additional year of service up to and including 20 years, 20 days' wages will be paid; bonus 20 days' wages additional. After 20 years of service, 30 days' wages for each year, and bonus 20 days' wages. The bonus is intended to take into account ambition or family conditions.
>
> According to these regulations for discharge a man after 15 years service would receive, including the legal 14 days, a compensation of 275 to 295 days' wages, or approximately one year's earnings.

Other plants have authorized similar scales. These compensations have lately become of importance, particularly after the Government arsenals, which had to reduce their forces considerably on account of disarmament, paid similar and even higher compensations to workmen discharged. They have repeatedly been the cause of labor troubles. Some of the employees, particularly the workmen of the machine shops of the Kobe steelworks, were not satisfied even with that scale. They intended to strike one day as a demonstration, but the management closed the machine shops for 14 days.

In some works, as was the case only recently with the Sumitomo copper works, this compensation, after several years' service, amounted to a year's earnings. In most of the plants of larger size the workman pays every month a small portion of his wages into a savings bank, which is managed by the company for its salaried employees and the workmen.

With these savings and the compensation at the time of discharge the Japanese workman is able to bear easier the economic consequences of the discharge. The Japanese skilled workman, furthermore, endeavors to make himself proficient in more than one branch, so as to make it easier for him to find employment. All these circumstances contribute to the slow progress in organizing labor. But the ultimate reduction in wages, which must be accomplished, considering the necessary reduction in prices, will hardly be possible without struggles. How far these will influence the development of the unions can hardly be predicted.

Long Work Day

The work day in the steel industry is yet as a rule the 12-hr. day with alternating shifts. The workmen, however, are demanding an 8-hr. day, but this has been granted so far only in sporadic cases. The Kawasaki Dockyard Co., Kobe, a few months ago instituted the 8-hr. day. In other industries and in branches of the steel industry working only single shifts, the day turn is 9½ hr. Only the silk industry retains the 10-hr. day as a rule. In the steel industry Sunday is commonly a day of rest; in other industries, work usually goes on over Sundays. In this case two days of rest are granted the workmen in each month, as a rule the first and fifteenth. The number of work days per year is, therefore, greater

Table XV.—Summary of Furnaces

Capacity, Tons	Blast Furnaces, Number in Japan	Korea	Manchuria
300	1	..	..
270	2	..	..
250	1	..	..
230	2	..	..
215	1	..	..
150	1	2	..
130	..	..	2
120	2	..	..
100	3	..	..
60	1	..	..
50	2	..	..
35	1	..	..
30	2	..	..
25	4	..	..
20	11	..	2
18	1	..	..
15	3	..	..
12	1	..	..
10	1	..	..
7	2	..	..
5	14	..	..
Total	56	2	4

Capacity, Tons	Open-Hearth Furnaces, Number in Japan	Korea
60	4	..
50	3	2
40	1	..
25	52	..
15	13	..
10	7	..
8	7	..
7	3	..
6	2	..
5	6	..
4	1	..
3	1	..
Total	105	2

Capacity, Tons	Bessemer Converters, Number
10	2
2.5	2
2	5
1.5	2
1	1
0.95	1
0.9	1
0.8	1
0.7	1
0.5	2
Total	18

Crucibles, Number	Electric Furnaces—Pig Iron and Ferroalloys	Steel
51	102	42

Total annual capacity open-hearth furnaces—1,500,000 tons.
Total annual capacity blast furnaces over 100 tons—1,050,000 tons
Total annual capacity all blast furnaces—1,250,000 tons.

Table XVI.—Number of Industrial Workers
Government Industries

Year	Number of Workers		Daily Wages, Yen		Working Days per Year		Working Hours per Day	
	Male	Female	Male	Female	Male	Female	Male	Female
1914	106,184	33,003	0.64	0.28	315	301	10.1	9.5
1915	128,675	37,167	0.70	0.31	314	301	10.8	9.9
1916	131,351	36,389	0.71	0.32	309	306	10.6	9.8
1917	118,300	31,376	0.78	0.34	307	295	10.5	9.2
1918	123,087	36,349	0.89	0.39	306	296	10.4	9.6
1919	122,484	41,087	1.10	0.54	314	302	10.3	9.5

Private Industries

Year	Number of Workers—Adults		Number of Workers—Juvenile		Average Daily Wages in Yen—Adults		Average Daily Wages in Yen—Juvenile		Working Days per Year	Working Hours per Day
	Male	Female	Male	Female	Male	Female	Male	Female		
1914	318,667	535,297	40,286	17,209	0.54	0.26	0.19	0.14	299	11
1915	350,967	559,823	39,240	11,631	0.56	0.26	0.22	0.16	299	11
1916	458,632	636,669	48,723	13,516	0.57	0.28	0.23	0.18	304	12
1917	567,844	713,120	58,236	17,315	0.67	0.33	0.29	0.21	304	11
1918	646,115	763,081	74,190	21,315	0.92	0.48	0.46	0.23	301	11
Of these latter, the machine industry, which includes iron and steel, shows:										
1918	272,610	18,296	23,567	3,701	1.14	0.48	0.48	0.33	306	10.5

than 300, in spite of the legal and religious holidays.

Since the representative of the Japanese Government at the labor conference in Washington in 1919 signed the agreement made at this conference, it is to be expected that in Japan, too, the 8-hr. day will some time be generally adopted. This agreement, however, has so far not been ratified by the Japanese Government. The present Government is of the opinion that, on account of changed conditions all over the world, it would not be advisable for Japan to ratify this agreement yet, since the majority of the other powers which signed the agreement in Washington have not yet concluded its ratification.

The age limit for juvenile workers is fixed at 12 years; for night work, workers below 15 years can not be employed at all.

Benefit Organizations

Sickness and accident insurance, regulated by law, has not yet been introduced, but a number of works have their own accident and sick benefit organizations. Where no such organization exists, the men receive in most cases during sickness half their wages.

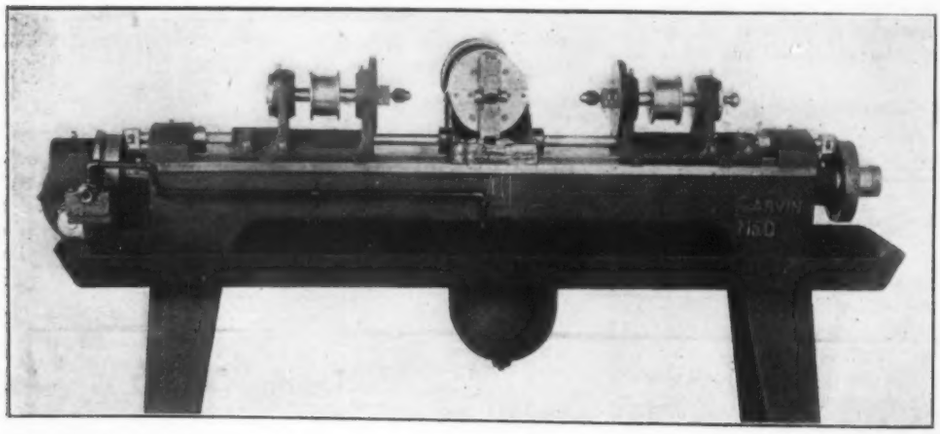
Employment agencies have been organized by the city governments of the larger cities. Government inspection of industries, which will supervise working places and industrial shops in regard to sanitary and safety equipment, is, like many other things, in the development stage.

It is to be expected that the Japanese steel industry will develop, as in the past, in an ascending curve. Even the present depression will be surmounted.

Charles M. Schwab, who heads the committee of business men which is enlisting special subscriptions to the Harding Memorial Fund, has announced a contribution of $25,000 received from the American Iron and Steel Institute.

Duplex Horizontal Drilling Machine

The Garvin Machine Co., New York, has brought out a duplex horizontal drill designated as the No. 0, which is arranged with cam feeds to the heads and an automatically-operated air chuck, for the rapid drilling of small parts.



Duplex Horizontal Drill With Cam to the Head and Automatically-Operated Air Chuck, for Rapid Drilling of Small Work. Two sets of change gears and cams are provided to give production of 11 or 16 pieces a minute

The general construction of the machine may be noted from the accompanying illustration. The heads work longitudinally along the bed by cam action and a spring in each head serves to keep the cam roller against the cam. The piping for the air operated chuck may be seen along the front of the machine, the air valve being at the left, as shown. The drilling spindles are mounted on ball bearings and may be operated at speeds up to 3000 r.p.m.

The machine is equipped with two sets of cams and change gears, one set giving a production of 11 pieces a minute and the other 16 pieces a minute. The machine may be adapted also to operations other than drilling.

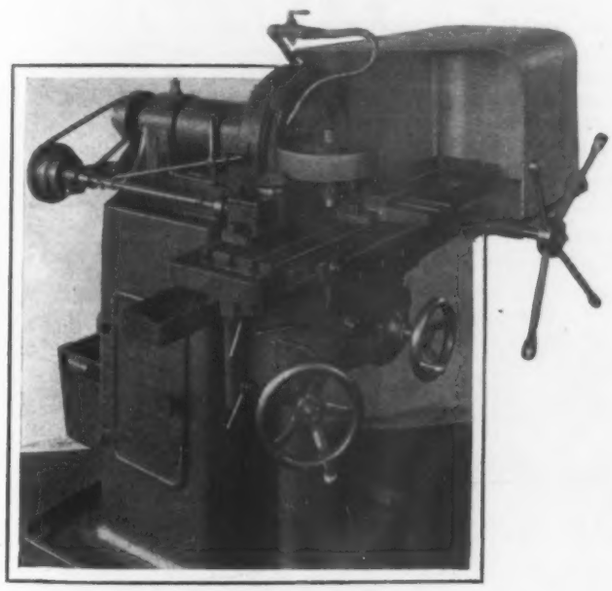
Freyn, Brassert & Co., engineers, Chicago, have been appointed consulting engineers in connection with the installation of a dock and ore-handling machinery, as well as the remodeling of one of the existing blast furnaces, at the plant of the Tonawanda Iron Corporation (American Radiator Co.), North Tonawanda, N. Y.

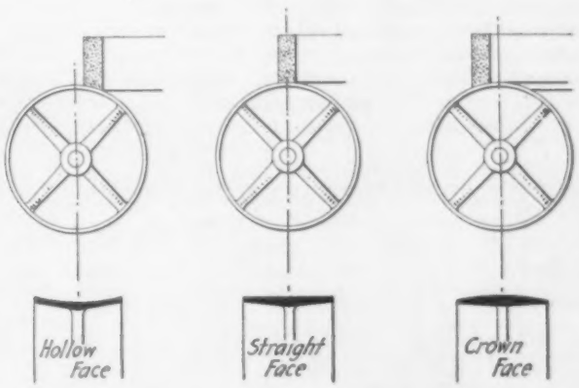
PULLEY GRINDING MACHINE

Finishes Straight or Crowned Pulleys from the Rough After Hole Has Been Chucked

The grinding machine illustrated, for finishing the face of a pulley from the rough after the hole has been chucked, has been placed on the market by the Graham Mfg. Co., Providence. The faces may be ground straight, crowned or hollow.

The capacity and limits of the machine are not definite. The arbor and splash pans accommodate pulleys up to 24 in. in diameter, and a width of face up to 6 in. is considered reasonable. The capacity is increased by lengthening the cross feed shaft and extending the splash guards. Although the field of the machine is in finishing pulleys of 4 to 20 in. in diameter, variety is indicated in the capacity to grind pulleys 6 x 6 in., and 30 x 6 in. of standard design. Light pulleys with small holes—for example, one of 16 x 2½ x ⅝ in. hole weighing 10 lb.—are said to be finished as readily as those of standard design. Segments, external cams and other irregular peripheral surfaces may also be ground. For incomplete circumferences or work without holes a general utility plate, which engages the driving burr is employed.





Grinding Machine for Finishing the Face of Pulleys From the Rough After the Hole Has Been Chucked. Segments, external cams and other irregular surfaces may also be ground. The outstanding feature is the driving burr which rotates the pulley being ground. The various settings of the pulley and abrasive ring for different faces are shown above

The grinding is done on the edge of a cup or ring wheel abrasive, which is mounted on a horizontal spindle. The pulley is held by a stationary vertical arbor and is free to revolve around, and up and down, upon it. It is rotated, as well as supported by a small cone-shaped driving burr located at the rim of the pulley and as nearly as possible under the down thrust of the abrasive ring. The pulley rotating mechanism and the vertical arbor are mounted upon a heavy table which can be moved in all directions. The driving burr receives its motion from a worm gear and worm, driven through cone clutch and universal joint mechanism from the rear end of the main spindle.

The construction of the machine may be noted from the illustration. The main elements are the column, the knee supporting the table in front, and the head, which is bolted on top of the column and carries the main spindle. A pressed steel chuck, or abrasive ring holder, is mounted on the front end of the spindle, as shown. The abrasive ring is 12 in. in outside diameter, 3 in. deep, and runs about 1500 r.p.m. The construction of the ring holder permits the ring to be set out as it wears off, by an adjustment nut, until about ⅝ in. is left. The entire chuck may be readily removed for changing abrasive rings. The spindle is mounted in taper roller bearings and end-play is said to be eliminated by mounting the rear bearing in a sliding sleeve, which by means of a spring exerts a pressure of 125 lb., keeping the front bearing tight in its seat.

The arrangement of the knee on the column which supports the table is similar to that of a milling machine, the method of raising and lowering the knee and the cross feed arrangement being similar also. The table is adjusted endwise by a pilot wheel, which is necessary in cases where the machine is used for straight flat work. The abrasive ring holder is surrounded by a cast-iron guard for wet grinding, and the knee supports a large hood and a trough that returns the water to the tank. Provision is made for attaching auxiliary splash guards.

In beginning operations the vertical pulley arbor and the driving burr are brought into proper relation with the abrasive ring. To produce an even crown, the middle of the face must be on the level with the center of the main spindle. The vertical arbor is located in front of the rim where the cutting takes place; for a crown, it is set a little nearer the center of the ring and grinding begins on the inside corner, but it will wear back until the whole face becomes concave. The various settings of the pulley and abrasive ring for hollow, straight and crown face, respectively, are shown in the line illustration. The abrasive ring has contact across the entire width of the pulley, regardless of the shape of the face. The speed of the face of the pulley being ground is from 50 to 250 ft. per min., depending upon the condition of the casting, and the hardness and grain of the abrasive ring, and finish required.

That the pulley may be put on and taken off without any obstruction, is emphasized as of great importance in high speed production. The rigidity of the arbor is also a feature claimed.

The outstanding feature of the machine is the driving burr, which is only 4 to 5 in. above the table and consequently rigid. It is said never to fail to rotate the pulley, is not in the way and does not require attention. The driving burr may be placed either inside or outside of the rim, but should be as nearly as possible under the down thrust of the abrasive ring.

The machine requires 10 hp. to drive it at a maximum capacity. The weight is 2000 lb. and the floor space occupied about 6 ft. x 6 ft.

T. Y. Olsen, vice-president of the Tinius Olsen Testing Machine Co., Philadelphia, was the speaker at the December meeting of the Cincinnati Chapter, American Society for Steel Treating, Dec. 13. His address dealt with the development of testing machinery and was illustrated with lantern slides. The speaker for the January meeting, to be held Jan. 19, will be Prof. H. M. Boylston, Case School of Applied Science, Cleveland, on the subject, "The Microscope as Applied to Heat Treating." At the February meeting, to be held Feb. 14, the speaker will be Prof. H. F. Moore, University of Illinois, and the subject, "The Fatigue of Metals."

Electrical Steel-Mill Development in 1923

Extension in Use of Motor Drive for Main Rolls—Largest Geared Drive Is 6250 Hp.—Highest Induction Motor Voltage Now 13,200

AT the Buffalo annual convention of the Association of Iron and Steel Electrical Engineers the annual report of the electrical development committee was presented by the chairman, Walter C. Kennedy, operating engineer Worth Steel Co., Claymont, Del.

Pointing out that electrical developments naturally take some time to reach a stage of successful, practical use and that, consequently, each successive annual report has a certain amount of overlapping, due to the gradual introduction of various devices, this report is divided into a series of topics. These include the main drive, power house equipment, circuit breakers, electric heating, lightning arresters, static condensers and miscellaneous equipment. Of principal interest are the topics of main drive and electric heating. What the report has to say on these subjects is abstracted in the following paragraphs.

Main Drive Equipment

Since the first installation of this kind the list has been growing rapidly and this year is no exception. Among the interesting features three are of particular prominence—the larger number of motors replacing steam engines; the extent to which gears have been used; the use of direct current exclusively on several adjustable speed applications. Economy of operation is causing rapid replacement of steam-engine-driven equipment. The growth in this line has been phenomenal since the first electric drive for a reversing mill, ordered in 1917, was put in operation by the Lackawanna Steel Co. in 1921.

New Main-Drive Electric Power Installations

Item	Company	Hp.	Volts	R.p.m.	Mill	Connected
1	American Rolling Mill Co. (2)	2000	*6600	505	Rolling	Gear
2	American Rolling Mill Co. (2)	600	*2200	885	Rolling	Gear
3	American Rolling Mill Co. (2)	500	*2200	575	Rolling	Gear
4	American Rolling Mill Co. (4)	400	*2200	575	Rolling	Gear
5	American Rolling Mill Co. (10)	300	*2200	575	Rolling	Gear
6	Atlas Steel Corporation	700	240dc	135/360	10-in. Merchant	Direct
7	Bethlehem Steel Corporation	7000	700dc	0/140	40-in. Blooming	Gear
8	Bethlehem Steel Corporation	300	†2200	750	10-in. Bar	.....
9	Buckeye Rolling Mill Co.	1000	*4000	720	18-in. Rail re-rolling	.....
10	Calumet Steel Co.	400	*4000	585	Slitting stand	Gear
11	Columbia Steel Co.	1500	*2200	360	Sheet	.....
12	Columbia Steel Co.	1800	2200	514	Rod	.....
13	Dilworth, Porter & Co.	700	*2200	390	18-in. Bar	Gear
14	Firth-Sterling Steel Co.	550	250dc	120/300	10-in. Merchant	Direct
15	Follansbee Brothers Co.	500	*2200	442	Cold Sheet	Gear
16	Ford Motor Co.	8000	13200	240	Blooming	Direct
17	Ford Motor Co.	4500	500dc	67½/110	14-in. Merchant	.....
18	Halcomb Steel Co.	620–200	*440	321/107	9-in. Merchant	.....
19	Halcomb Steel Co.	500–250	*440	130/65	14-in. Merchant	.....
20	Illinois Steel Co.	5000	†6600	370	132-in. Plate	Gear
21	Illinois Steel Co.	5000	†6600	370	90-in. Plate	Gear
22	Inland Steel Co.	6250	†2200	368	24-in. Cont. billet	Gear
23	Inland Steel Co.	1500	†2200	368	Sheet bar finish	Gear
24	Inland Steel Co.	4500	†2200	300/500	.....	.....
25	Inland Steel Co.	4500	1500dc	67½/110	14-in. Merchant	.....
26	Jones & Laughlin Steel Corporation	5750	†6600	94	18-in. Billet	.....
27	Jones & Laughlin Steel Corporation	5750	†6600	94	21-in. Billet	.....
28	Knoxville Iron Co.	800	*2200	900/720	9-in. Merchant	.....
29	Metal & Thermit Corporation	1300	*4000	360	Sheet	.....
30	Michigan Steel Co.	1500	†4600	300	Sheet	.....
31	National Stamping & Enameling Co.	3000	*2200	235	100-in. Plate	Gear
32	Newton Steel Co.	2000	*2200	234	Sheet	Gear
33	Newton Steel Co.	300	*2200	340	Cold sheet	Gear
34	Otis Steel Co.	6500	....	0/120	40-in. Reversing blooming	Direct
35	Otis Steel Co.	1800	†6600	500	20-in. Strip	.....
36	Otis Steel Co. (3)	1500	600dc	280/420	20-in. Strip	.....
37	Otis Steel Co. (3)	1800	600dc	115/230	20-in. Strip	.....
38	Otis Steel Co.	3000	†6600	375	24-in. Sheet bar	.....
39	Otis Steel Co. (5)	375	230dc	430/860	Cold strip	Gear
40	Otis Steel Co.	350	†2200	242	Cold strip	Gear
41	Phoenix Iron Co.	3000	600dc	0/485	24-in. Structural	Gear
42	Phoenix Iron Co.	2500	*2200	500	22-in. Bar	Gear
43	Pittsburgh Crucible Steel Co.	2500	†6600	150	Billet	.....
44	Standard Underground Cable Co.	300	*2200	575	Rod	Gear
45	Takata & Co.	1000	*2200	293	Sheet	Gear
46	Timken Roller Bearing Co.	800	230dc	410/720	16-in. Roughing	Gear
47	United Alloy Steel Co.	360	230dc	300/600	Merchant	Direct
48	Youngstown Sheet & Tube Co.	2000	*2200	234	Sheet	Gear
49	Youngstown Sheet & Tube Co.	400	†220	375	Tube	.....
50	Youngstown Steel Co.	1200	*2200	505	29-in. Roughing	Gear
51	Youngstown Steel Co.	1500	*2200	705	24-in. Finishing	Gear
52	Washburn Wire Co.	1000	*2200	710	20-in. Blooming	Gear
	COPPER AND BRASS MILLS					
53	Am. Insulating Iron & Cable Co.	600	*440	360	.....	.....
54	Am. Insulating Iron & Cable Co.	600	*440	900	.....	.....
55	American Brass Co.	500	*2200	600	.....	.....
56	Taunton New Bedford Copper Co.	500	*2200	600	.....	.....
57	Western Cartridge Co.	600	*2200	514	.....	.....
58	Western Cartridge Co.	500	*2200	514	.....	.....
	FOREIGN					
59	Cia Siderurgica del Mediterraneo	5000	700dc	0/120	40-in. Blooming	Direct
60	Cia Siderurgica del Mediterraneo	3750	700dc	0/150	24-in. Structural	Direct
61	Cia Siderurgica del Mediterraneo	3000	‡5250	735	36 x 111-in. Plate	Gear
62	Consolidated Rolling Mills, Mexico	300	‡3000	750	16-in. Merchant roughing	.....
63	Consolidated Rolling Mills, Mexico	500–250	‡3000	750/375	10-in. Merchant finishing	.....

NOTE: Numbers in parentheses after company names show number of drives.
*60-cycle current. †25-cycle current. ‡50-cycle current.

This rapid increase in the use of electric drive is attributed to three causes—increasing cost of coal and, therefore, steam; increasing availability of reliable purchased power; developments in gear drive. All these developments have been gradual, but it is now recognized that in many cases a steel plant can buy power cheaper than make it and can get it with sufficient reliability for steel mill service.

Regarding gear drive, purchased power is in nearly every case of 60 cycles. For main roll equipment, 60-cycle power means practically a gear reduction, and here is seen one great development in this art which has required several years to accomplish. At one time gear reduction on a main roll mill drive was a questionable point, but now this form of drive, through its development, has become so reliable that there is no further question as to its use for this service. In many cases the flywheel is directly mounted on the motor shaft and the gear reduction, therefore, has to stand severe shocks of rolling. Even these equipments have given good success and, therefore, the success of the gear drive has really helped to a large extent to increase the number of motor applications through the use of purchased 60-cycle power.

Items 7, 14, 20, 21, 23, 41, 42 and 52 replace steam engines. Operators are realizing more and more that they cannot afford to keep these old steam engines in operation. It is not uncommon, from saving of attendance, maintenance and repairs, to more than pay for the fixed charges on the electrical installation, leaving a saving in power consumed as sure profit.

Items 20, 21, 22, 31, 41 and 61 are of interest as being geared drives of large capacity. The 6250-hp. installation for the Inland Steel Co. will be the largest geared drive in this country. It was formerly the practice to connect the driving motor directly to the lay shaft on continuous mills. On late installations, however, most of the drives are geared.

Items 7, 41, 59 and 60 are drives of the Ilgner type, consisting of direct current motors supplied with power from flywheel motor-generator sets. The drives for the Cia Siderurgica del Mediterraneo at Sagunto, Spain, are only part of a large order including all electrical equipment complete for these mills, rotary converters, auxiliary motors, control and switching apparatus. The 24-in. structural mill drive for the Phoenix Iron Works is of the Ilgner type, although it will not be reversed in ordinary operation. This type of drive allows the operator to slow the mill down to enter a piece, and then finish at a high speed, thus increasing the tonnage materially. All previous installations of this type and size have made use of direct connected motors.

During this year the largest a. c. and single-unit d. c. motors for operating main rolls have been purchased by the Ford Motor Co., items 16 and 17. The former is an 8000-hp., 240-r.p.m., 13,200-volt, slip-ring induction motor, which will be used to drive an interrupted continuous blooming mill built by the Morgan Construction Co. Incidentally, this is the first steel mill induction motor operating at a voltage exceeding 6600. The single unit d. c. motor is rated 4500-hp., 67½ to 100 r.p.m., 500 volts, and will be used to drive a 14-in. merchant mill.

Direct current power for this motor is supplied by two 2000-kw., 250-volt synchronous motor generators, the two generators being connected in series to give 500 volts for the motor armature. The synchronous motor driving the 2000-kw. generator is rated 2800 kva., 8 pf., 13,200 volts. Excitation for the synchronous motor and d. c. motor fields is obtained from a third 2000-kw., 250-volt motor-generator, which also supplies some power for auxiliary motors. A fourth duplicate motor-generator is held as a spare.

The largest induction motor with Kraemer system of speed regulation was also purchased during the year by the Inland Steel Co., Indiana Harbor, Ind., item 24. This motor, which will drive a 14-in. merchant mill, is rated 4500 hp., 300 to 500 r.p.m., 2200 volts, 25 cycles.

Electrical equipment for driving the 30-in. reversing universal skelp mill at the plant of the Youngstown Sheet & Tube Co., which was reported last year, has been installed and is now in operation. This motor replaces a twin simple reversing engine and its performance so far indicates that, when the additional continuous reheating furnaces are completed, the tonnage records made by the engine will easily be exceeded. The roll motor is a double-unit motor, rated 4000 hp. continuously at 80 r.p.m. and 11,500 hp. maximum at 75 r.p.m. The maximum speed is 135 r.p.m. The flywheel set consists of a 2500-hp., 6600-volt, 25-cycle, 500-r.p.m. induction motor, two 1800-kw., 650-volt d. c. generators and a 78,000-lb. steel plate flywheel.

The equipment for the Halcomb Steel Co., items 18 and 19, is of interest in that it covers the first polyphase brush shifting a. c. motors for main roll drives. This type of motor has been developed and applied to other work, as was previously recorded in the 1922 report, but the above installation is the first one being applied to mill drives. Speed control is obtained by two sets of brushes whose relative position on the commutator is altered by means of a motor-operated brush shifting mechanism. This motor has characteristics practically identical with the double-range Scherbius equipment and fills a long-felt want for an adjustable-speed a. c. drive where the power required is too small to make Scherbius or Kraemer apparatus feasible on account of the high initial cost of very small installations.

As mentioned in last year's report, the tendency toward simplicity of apparatus is still very pronounced. Instead of using complicated arrangements or special a. c. motors for speed variation, the tendency still seems to be toward the installation of d. c. drives, of variable speed motors and motor-generator sets.

Electric Heating

The use of electric heating in the iron and steel industry is still continuing to show advancement and development along some novel lines. We have ordinarily considered that electric power for this service in the steel plant has been applied or is more adapted toward making steel in some form of the electric-arc furnace. However, some new applications along this line have come to the front during the past year.

An adaptation of electric heating on finishing rolls of sheet and tin plate mills has been described by Gordon Fox.* The purpose of such heat is to prevent roll breakage and, from all accounts from the results obtained, it has been successful. The principle is one which no doubt would be well adapted to other cases. The method is new, convenient and economical. The application and operation can be so governed as to offer considerable possibility for decrease in roll breakage.

Electric Steam Boilers.—There has also come to our attention this year an important and interesting application of electric heat for generating steam by electricity. The electric steam boiler or generator is not exactly new, having been used in various parts of Europe for several years, but its development in this country has been within only the last two years and the last year especially has seen large units heretofore not conceived possible or practical. The development in this country has so far exceeded that of any European practice and has occurred along such novel lines that boilers are now being produced which are to be found nowhere else in the world. The electric steam generation has been particularly adaptable where large amounts of power are produced or purchased and where the question of load factor is of prime importance. While ordinarily it would be assumed that they would be of particular service on purchased power, still the developments are now showing that their use is increasing even where electric power is generated at the plant, especially where it is economical or advantageous to keep the load factor constant.

At Berlin, N. H., the Brown Co. has recently installed one three-tank boiler, operating at 22,000 volts, 3-phase, 60-cycle. This boiler is rated at 1800 kw., or approximately 1800 bhp., producing 54,000 lb. of steam per hour. The Brown Co. generates its own power from a hydro-electric power station and trans-

*Paper abstracted on page 974, Oct. 11.

mits it to the mills at 22,000 volts, the boiler operating directly on this voltage without the necessity of transformers. The equipment is intended to operate only on Sundays and other holidays, so that an operation of approximately 60 days per year has justified its cost and use.

Another boiler being installed by the same company, rated at 8000 kw., 2200 volts, 2-phase, 60 cycles, is intended to operate during the week to absorb surplus power. Indications seem to be that there will be a wide field of use for these electric boilers where surplus power from fluctuating loads is available.

Electric Furnaces.—A new type of induction furnace has recently been developed and brought to such a state of perfection that it should be of interest. Known as the Ajax-Northrup high-frequency induction furnace, it differs in principle from the ordinary induction furnace in that no iron core is used. This furnace has an air transformer whose primary is the furnace coil and whose secondary is the melt or the conducting crucible containing the melt. Such a transformer is, of course, not effective with a current of 25 to 60 cycles, but is supplied with a frequency of several thousand cycles per second by means of a special high-frequency converter.

The converter consists of a special transformer with internal reactances and discharge gap with the necessary instruments, etc., which gives a frequency of approximately 15,000 cycles per second. The above furnace is of small capacity, approximately 20 kw., and, therefore, used mainly for laboratory or research work where high temperatures of 2000 to 2500 deg. C. (3632 to 4532 deg. Fahr.) are required. Many steel plants are finding this furnace of great service in their research or metallurgical laboratories for investigation of alloy steels or similar work.

Resistance furnaces still continue to improve and are being used regularly on vitreous enameling processes which require a higher temperature than that previously obtained with this type of furnace.

High-temperature heating elements for installation in modified fuel-fired furnaces are under development.

Discussion

In discussing this report, Gordon Fox, electrical engineer Freyn, Brassert & Co., Chicago, pointed out that in the heating of sheet mill rolls, the question of saving of roll breaking takes secondary place compared with the problem of getting the rolls into proper condition for their work.

Graphite for Steel Melting Crucibles

Tests of American Graphite in Competition with That from Ceylon and from Canada Indicate That Native Product Is Satisfactory

IN a preliminary report by R. T. Stull and G. A. Bole of the Bureau of Mines on an investigation, conducted by the bureau into the properties of American graphite for use in crucibles, are described the results of foundry tests on specially prepared steel-melting crucibles. Tests have been carried on to determine the effect of substituting Canadian and Alabama graphites for Ceylon graphite in varying proportions. The data indicated that Alabama graphite is superior to Canadian graphite and, further, that Alabama can be substituted for Ceylon graphite to a large measure without lowering the quality of the ware. These tests were made on No. 70 size brass melting crucibles and were carried out under foundry practice. An attempt was made to modify the nature of Alabama graphite by heat treatment so as to resemble Ceylon graphite. Little advantage from the treatment was reported.

Experimental work proceeded along two lines: A study of bond clays for steel-melting crucibles and for brass-melting crucibles. Twenty-one sets of standard-size crucibles were made up of a body containing Ceylon graphite as standard, bonded with 21 bond clays. These tests were carried out under foundry practice, as were the former tests. Three domestic clays proved to be superior to the standard Klingenberg clay, formerly used in brass-melting practice, while, in the steel-melting industry, 13 domestic clays gave service superior to Klingenberg clay.

Testing the Graphites

In the final phase of the investigation, the bond clay mix which gave the best service in the above tests was adopted as a standard. Using this bond clay mix, steel-melting crucibles were made up from bodies containing five domestic and two imported graphites. The graphites tested were from Alabama (A), Canadian (K), Ceylon (C), Madagascar (R), Montana (M), New York (N) and Texas (T). When available, Ceylon graphite has been preferred by the crucible makers, with Madagascar next in order.

The body mix used in making up the crucibles included the graphite to be tested (50 per cent), Missouri washed pot clay (27 per cent), Kentucky ball clay No. 4 (13 per cent) and sand (10 per cent).

The first tests were run at a large foundry in the Pittsburgh district which was melting tool steel. The pots used had been made up and stored for more than 18 months and were dried with special care. They were stored behind the furnaces prior to starting the tests and were later put well back on the melting floor and moved up toward the furnaces each day. This was plant practice. As all the crucibles tested spalled badly, the test was discontinued. In seeking to account for the spalling, it was thought that the difficulty must have been due to rehydration of the body after 18 months' storage.

The remaining pots were accordingly reburned to 700 deg. Cent. and new C and T sets made up and burned. This presumably gave the C and T sets a slight advantage over the others in the subsequent tests, as some graphite is burned out during the firing. The later tests did not seem, however, to substantiate this assumption. The crucibles were finally tested at a large manufacturing plant in the East, melting tool steel. The pots were shipped immediately after baking and put in the driers at a temperature of 110 deg. Fahr., where they remained one week.

All test pots were thicker walled by ¼ to ⅜ in. and thicker bottomed by ½ in. than the commercial pots. The tests were run in the ordinary type of producer-gas fired, regenerative furnace, in which the direction of the gas was reversed every 30 min. The furnace was in good repair. The flames played directly on the pots, thus producing severe spalling conditions for the cold pots when first set. The furnace was said to operate at 2800 to 3000 deg. Fahr.

Each set of six crucibles was set in one pit. In addition to the seven graphites mentioned, the commercial pots used at the plant were added to the test. The plant was getting a service of six to seven heats from crucibles—the practice was to run a set of pots six heats and to permit them to cool. If upon examination they were found to be in fair shape, they were set aside and used to replace pots that failed to stand six heats. If there was an accumulation during the week, they were set in the furnaces Saturday morning for an additional heat. The charge consisted substantially of Swedish and American iron and selected scrap, together with the alloy. To this charge was added brick dust for slagging and charcoal in appropriate amount.

The crucibles were charged with 100 lb. of metal and placed on the melting floor near the furnaces for 4 hr. before going into the pits. The six pots were

placed in the furnaces in about 1 minute and all drawn in about 2 minutes. The pots were recharged hot, being out of the furnaces between heats about 6 minutes. They were hand poured into ingot molds and recharged without using a collar. During this operation, the crucibles had fallen in temperature to a very dull red or black.

The life of the pots, together with the average time required for a melt and the cause of failure of those used in the steel foundry tests are shown in the table.

Observations During the Test

Analysis of the steel after the first melts showed that the T and A series carbonized the steel less than did series C. It was more difficult to melt the steel in all of the pots of the test series than in the commercial pots, due, in part, at least, to their low carbonizing effect. This condition was so pronounced that 4 oz. of charcoal were introduced with the charge during the subsequent tests, to bring the melting time to about the same as that of the commercial pots against which the tests were run. If this had not been done, a higher temperature would have been maintained in the furnaces to finish a melt in the customary time; on this account the melters stated that the pots were more refractory than those being used. The so-called "refractory" character of the crucibles under test was due in greater part to the bond clays used than to the graphites, as Ceylon graphite was used in the commercial pots as well as in one set of the pots under test. Series T, A and C were particularly refractory.

The chief metallurgist was well pleased with the low carbonizing effect of the pots, since it is possible to produce a steel of more nearly the desired analysis if the pot carbonizes the charge to a small extent. The crucibles resembled clay pots somewhat in this respect.

The K crucibles softened and were cut badly by flame. This condition was noted even before the charge was melted. At the end of a melt a decided fusion had started and upon removal from the pit, masses of slag and coke adhered to the bottoms and sides of the pots. The M series showed small cracks when set in the pits. These cracks later opened up, thus rendering them too dangerous for resetting.

Data on the Tests

Series	No. of Heats	Average Heats	Average Time per Heat Hr.	Min.	Failure
T	All pots 7 4 pots 8	7.67	3	32	Cut deeply at wash line and worn thin generally
A	All pots 7 1 pot 8	7.17	3	36	Work fairly thin, some scaling.
C	All pots 7	7.0	3	36	Considerable scaling, thin at wash line, could not carry metal
R	All pots 7	7.0	3	39	Worn thin generally, too thin to carry metal
N	All pots 6	6.0	3	36	Walls too thin, body weak
K	All pots 1	1.0	4	11	Cut badly by flame, parts slagged away and softened, surface of walls pasty
M	All pots 1	1.0	4	18	Old and new cracks opened up

Summary

All factors being taken into consideration, the graphites gave service in the following order: T, A, C, R, N, M, K. Two of the series under test gave somewhat superior service to the commercial pots. The T and A series, in addition to a longer life than the commercial pots, have an advantage in that they carbonize the steel to a lesser degree.

It is realized that a larger number of pots in each series, and an extension of the tests to include several types of charge, would have given a truer average of service, but in so far as the tests are conclusive, they indicate that a superior steel-melting pot can be made from American graphites bonded with American clays.

Fifteen waste-heat boilers, each with a capacity for developing 450 hp., will be installed in connection with the open-hearth steel department of the Carnegie Steel Co., at its Farrell, Pa., works. Blast furnace gas will be fed the boilers and a large annual saving in coal consumption is expected. Power derived will be used for rolling mill operations.

SELLING STEEL ABROAD

World-Wide Distribution Policy Not Conducted by Manufacturers

WASHINGTON, Dec. 18.—With but few exceptions, American iron and steel manufacturers have not conducted a world-wide distribution policy, nor have they concentrated on any special field, says Director Julius Klein of the Bureau of Foreign and Domestic Commerce, Department of Commerce, in his annual report which has just been made public. This comment is made in connection with the activities of the Iron and Steel Division, of which Luther Becker is chief.

It is now generally conceded, Mr. Klein points out, that foreign trade is essential to balance domestic commerce. Moreover, he states that it is acknowledged that foreign markets must absorb a considerable part, perhaps as much as 15 per cent, of the country's steel production, which has been enlarged during and since the war until it represents a theoretical ingot capacity of 52,000,000 gross tons.

Dr. Klein at this point says: "Among the countries of the world the United States leads in the highly specialized production of its iron and steel industry. The result is mass production of quality goods at a unit cost which gives American manufacturers their opportunity in the markets of the world. Specialization in world-wide distribution, however, has not followed apace, and it is in this field that the United States loses its advantage, gained through quantity production, to its European competitors who have developed this phase of foreign commerce to a marked degree."

It was further stated by the director that recognizing from experience that the proper time to go after export trades is when business is good at home, the division used this fact to advantage during the past year. Certain markets of the world were pointed out in which there was no American representative whatever, and others where American trading interests are inadequately looked after.

"The attention of the industry was called to the advantages resulting from the necessity of transshipping goods in foreign bottoms in order to reach certain foreign ports," said Dr. Klein. "A plan was suggested whereby American representation in such markets could be effected to advantage. The existence of special lines of trade in certain markets where business has been completely absorbed by our competitors was brought to the attention of American exporters. The division's outline, prepared at the commencement of its activities, to guide the Government's foreign representatives in their search for useful information, was productive of excellent results. Much of the material submitted was used in the campaign to stimulate among American manufacturers a broader and increasing interest in the iron and steel trade of the world.

"That the iron and steel division has succeeded in its efforts to enlist a larger number of American manufacturers of iron and steel commodities of all descriptions is obvious from the extraordinary growth in inquiries on foreign trading matters received during the year. For the week ended Oct. 22, 1921, just 20 inquiries on iron and steel subjects were answered by the bureau in Washington and its seven district offices in the United States. In one of the last weeks of the fiscal year 1921-22—that ended May 27—the inquiries answered totaled 420. As the year 1922-23 progressed, inquiry increased rapidly, doubling the best record of the previous year in the week ended June 16, when 860 inquiries were received and answered."

Dr. Klein says that the exporters' index now comprises more than 300 American firms which are actively engaged in foreign trade. Much stress was laid on the effectiveness of personal contact, wherever feasible, between the inquirer and the divisional personnel. This was accomplished through frequent visits of the chief of the division to the leading exporting centers and interviews in the bureau with visiting exporters. Near the close of the year Maurice H. Bletz joined the staff of the division and rendered valuable service, particularly in answering inquiries relative to Latin American markets, where he had for seven years sold American iron and steel and other engineering products.

SANITARY PIPE REVIVES

Demand Increases as Year Closes—More Activity at Anniston Plants

BIRMINGHAM, ALA., Dec. 17.—Anniston, Ala., 60 miles east of Birmingham, is known as the largest cast iron sanitary pipe and fittings manufacturing center in the world, the 14 plants in the city being able to produce more soil pipe than any other place. Practically all of the iron melted at that place comes from Birmingham or the immediate Birmingham district, though there is a blast furnace in Anniston. As with the sanitary pipe business throughout the country, the year just coming to an end had its fat seasons and the lean. For three months there was spasmodic operation, lagging production and so on, but at no time in 1923 were all the plants in Anniston shut down nor was the idleness of long duration.

Gadsden, 50 miles northward from Birmingham and less than 35 miles from Anniston, boasts of its production of sanitary cast iron pipe and fittings, having several pipe shops there. North Birmingham and East Birmingham, in the city limits of Birmingham, and Bessemer, 12 miles south of Birmingham, have numerous pipe shops. These, too, had active operations during the year and some had dull periods, shutdowns intermittently, but all doing more or less.

Warehouses and yards in Anniston carry considerable sanitary pipe and fittings, but as the year comes to an end there is a recuperation and, on the whole, a favorable year will be rounded out. Prices in the last four weeks went up five points, standard sanitary pipe selling at $55, while the heavy grade brings $45. Recently there has been some selling. Anniston has an ample supply of labor, and though there were shutdowns and lagging operations, but little of the labor moved from the city. In other words, the labor remained with the work in Anniston and no complaint worthy of mention has been made as to shortage of labor there. The shops are working a large part of the time now and during the first week in November, when the pig iron market was active, the sanitary pipe makers bought freely, their policy having been for some time to buy frequently and in small lots, this interest being the one that was placing spot business. During the better part of the summer, as frequently stated in THE IRON AGE, the sanitary pipe trade was very quiet, while the pressure pipe plants, manufacturers of water and gas pipe, were operating to capacity the year through almost and are still getting contracts which promise to keep them busy for some time. When the advance in prices was announced reports started as to the activity of the sanitary pipe market from this point. The Birmingham Machine & Foundry Co., Birmingham, for instance, with two pipe shops, had one shut down and the other operating. During November the demand picked up to such extent that it became necessary to start the new shop. Both are now operating and all stock removed from warehouse.

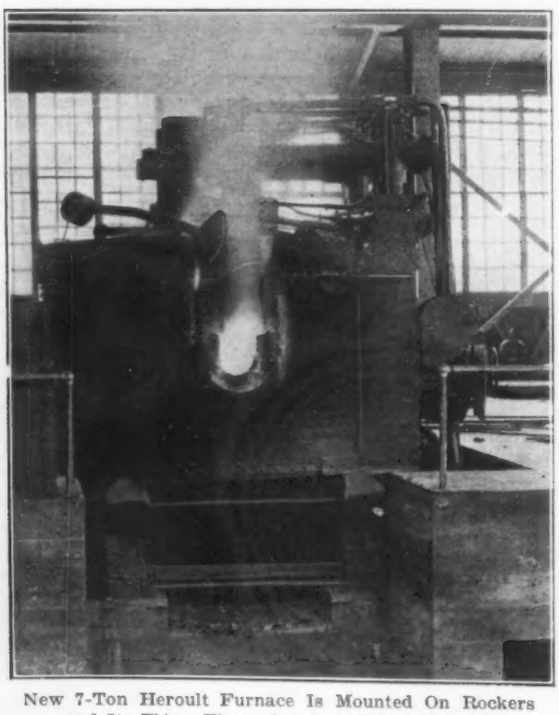
Anniston boasts of the Anniston Foundry Co., the Emory Foundry Co., Rudisill Soil Pipe Co., Alabama Pipe & Foundry Co., Standard Foundry Co., Union Foundry Co., Interstate Foundry Co., Central Foundry, Anniston Soil Pipe Co., Ornamental Pipe & Foundry Co., and others.

Alabama made sanitary pipe is shipped to all sections of the country and is exported. The McWane Cast Iron Pipe Co., Birmingham, has been shipping its product to Hawaii, while other countries have taken pipe from this district.

The indications are that there will be but little sanitary pipe on hand either in Anniston, Gadsden, Birmingham or Bessemer in a short while, and if expectations are realized on the turn of 1924, there will be need for speeding up.

Changes in the Heroult Electric Furnace

The Heroult electric furnace has recently been improved and changed from the old type, according to information obtained from the American Bridge Co.



New 7-Ton Heroult Furnace Is Mounted On Rockers and Its Three Electrodes Are Closer Together

The new furnace is mounted on rockers, thereby differing radically from the old counterweight type of furnace tilting on a pivot. The electrodes have been grouped closer together in order to save the walls. While the mast on the back of the furnace is lower than formerly designed, it has been given a greater electrode lift, thereby enabling the electrodes to be raised completely out of the furnace.

In case it is desirable to have the electrical equipment and transformer house off the charging platform, it has been arranged to have the transformers under the floor and carry flexible leads under the platform connecting to water cooled copper bus bar tubes that run up the side of the mast. The mast may be located on the side or rear of the furnace, depending on what method of charging is desired.

The transformer capacity has been increased on all furnaces so that a wide range of secondary voltages may be used in conjunction with dual voltage control, which permits the use of any two voltages during the course of operation.

Strength of Steel at High Temperatures

WASHINGTON, Dec. 18.—The strength retained by steel when heated to red heat, as in a fire, and the resistance which it offers to forging are being determined in a series of tests now under way at the Bureau of Standards. Measurements of tensile strength have been made at temperatures up to 1400 deg. Fahr., and measurements of compressive strength and forging resistance up to 2200 deg. These tests have shown that all steels suffer a marked loss of strength and rigidity at temperatures in the neighborhood of 900 deg., says a statement issued by the bureau.

The tests have been made with specially constructed apparatus on one of the smaller testing machines, which has been equipped for the purpose with an electric furnace in which the specimen can be subjected to heat and to tension, compression or drop hammer blows.

Experiments are now being made for the purpose of finding an alloy which will still retain a considerable portion of its strength at temperatures up to 1200 to 1600 deg.

MAY EXTEND LAW

No Other Legislation as to Immigration Will Probably Be Enacted by This Congress

WASHINGTON, Dec. 18.—Extension of the 3 per cent immigration law, which expires on June 30, 1924, is the only immigration legislation that can be taken up at the present session of Congress, according to statements made by leaders in Congress to Secretary of Labor Davis. It is the belief that there will be no difficulty in continuing the present law exactly as it now stands. The statement of leaders in Congress has been a source of disappointment to the Department of Labor, which had hoped that Congress would begin early consideration of its alien code bill which Secretary Davis and members of his staff are now drafting and which covers all phases of immigration and naturalization, including a provision for the enrollment.

"Our immigration laws have grown up by piecemeal and apparently we have no settled immigration policy," Mr. Davis said. "The proposed alien code bill, which I intend to have introduced in Congress, would provide for selective immigration, giving us the right to say what immigrants should be permitted to enter the country. I am opposed to Orientals coming to the United States as well as immigrants of all other races that cannot or will not assimilate with us."

Secretary Davis said that business men of the United States are squarely behind the Department of Labor in its effort to obtain and develop a policy of selective immigration. He pointed out that leaders in business have become alarmed in regard to the inferior class of Europeans and others, many of whom, it is declared, are not laborers but engage in different sorts of businesses in the United States and drive out native Americans by underselling or by other methods well known to all.

New Standard Samples of the Bureau of Standards

The Bureau of Standards is now prepared to issue the following new standard samples: Sample No. 55, ingot iron, $2 per 150g; Sample No. 56, phosphate rock, $2 per 75g, and Sample No. 62, manganese bronze, $3 per 150g. Samples may be paid for in advance, with order, or through parcel post C.O.D.

The analyses of these samples are as follows: Ingot iron, 0.013 C, 0.019 Mn, 0.003 P, 0.017 S and 0.001 Si; phosphate rock, 31.33 P_2O_5, 3.30 Fe_2O_3, 3.07 Al_2O_3, 44.83 CaO and 0.40 MgO; manganese bronze, 59.06 Cu, 35.06 Zn, 1.60 Mn, 1.13 Fe, 1.13 Al, 0.81 Sn, 0.57 Pb, 0.63 Ni and 0.02 Si.

In addition to these standards the following samples will be ready for distribution with provisional certificates on Jan. 1: No. 57, refined silicon, No. 58, 75 per cent ferrosilicon; No. 59, 50 per cent ferrosilicon; No. 60, low carbon ferrovanadium; No. 61, high carbon ferrovanadium, and renewal No. 4c cast iron.

Sample No. 63 phosphor bronze bearing metal is in the hands of the cooperating analysts and will be distributed about March 1.

Bethlehem-Midvale Merger Hearing Continues at Buffalo

BUFFALO, Dec. 18.—Hearings before the Federal Trade Commission on the Bethlehem-Midvale merger will likely be continued in Buffalo until after Jan. 1, according to indications today. An adjournment will be taken this week until after the holiday period.

Fabricators and jobbers were heard before Examiner McCorkle. To date the attorneys for the commission have called about 15 witnesses.

Among those who testified at recent sessions are: George S. Rogers, vice-president of Beals, McCarthy & Rogers, Buffalo; Bayliss O'Bannon, purchasing agent, Buffalo Steel Car Co., Buffalo, and Edward L. Cullen, secretary and treasurer of the Phoenix Iron Works, Meadville, Pa.

Tarnish Resisting Silver Sought by Government

WASHINGTON, Dec. 18.—The problem of making silverware more resistant to tarnishing is already fairly on the way to solution at the Bureau of Standards, according to a statement made today by Dr. George K. Burgess, the director. Alloys have been tested at this bureau which proved very much more resistant to tarnishing than the usual sterling silver, and the problems now to be worked on are chiefly those connected with the production and working of the better alloys.

This work was begun at the bureau early in 1917, was dropped during the war, and was resumed in 1922. A study has also been made of methods for detarnishing silver, and this has been embodied in a report sent to the Department of Agriculture last spring. In all this work the bureau has enjoyed the hearty cooperation of the leading silver manufacturers, who have prepared some of the specimens to be tested.

A paper by Dr. G. W. Vinal, entitled "Tarnishing and Detarnishing of Silver," is to be published in January. Among other things, it was found that sterling silver is much less resistant to tarnishing than pure silver is, and this appears to be due to the copper which is put in sterling silver to harden it. In preparing the tarnish resisting alloys other metals were put in in place of copper.

Coke Production Declines

WASHINGTON, Dec. 18.—The production of by-product coke continued to sag in November, and the total output—2,942,000 net tons—was 157,000 tons, or 5 per cent, less than that in October, says the Geological Survey. A considerable part of the decline was due to the smaller number of working days in November, and the average daily output increased 1223 tons, or 1.3 per cent. Of the 70 by-product plants now in existence, 65 were active and five were idle. The coke produced was 81.1 per cent of the total capacity of all plants. Production of beehive coke declined even more sharply than by-product, and present estimates place the total at 1,103,000 net tons. This was a decrease of 187,000 tons, or 14.5 per cent. The total output of both varieties of coke was 4,045,000 tons, a decrease of 344,000 tons, and the lowest figure recorded since October, 1922.

The Calorizing Co., Pittsburgh, has acquired exclusive sales rights for "Hybnickel," the heat-enduring alloy perfected by Victor Hybinette. The arrangements provide a single source for all that has been developed by the Calorizing Co. and Mr. Hybinette working independently. In addition, the production facilities of both organizations will be preserved. Hybnickel will now be known as calite. The original analysis calite will continue to be supplied to those who have become accustomed to it and for whose requirements it is best adapted. Mr. Hybinette will be associated in a consulting capacity with the Calorizing Co.

The William B. Pollock Co., blast furnace builder and fabricating interest of Youngstown, has incorporated under the laws of Illinois, in order to do business in that State. The articles of incorporation, filed at Springfield, Ill., provide for a capital stock of $600,000. The company is now rebuilding a blast furnace at South Chicago of the Youngstown Sheet & Tube Co. The latter interest has authorized construction of another blast furnace at South Chicago, but the contract for it will not be awarded until after Jan. 1.

PROPOSES GEARING DEFINITIONS

Committee of Gear Manufacturers Association Submits Report for Discussion

Constructive discussion of the gearing definitions given below is being sought by the nomenclature committee of the American Gear Manufacturers Association. This committee has been working for some time in cooperation with the various standards committees of the association on the simplification of the nomenclature of gearing.

Nomenclature reports prepared by the association's bevel and spiral bevel gear committee and by the spur gear committee have been submitted. It is planned to add the necessary classifications required by helical, worm gears, and racks as the work progresses.

The sectional committee of the American Engineering Standards Committee has had the matter actively in hand, acting under the sponsorship of the gear manufacturers association and the American Society of Mechanical Engineers. In the simplification and improving of the various gearing definitions, the nomenclature committee of the American Gear Manufacturers Association submitted the definitions given below at the meeting held at Lake Mohonk, N. Y., Oct. 25 to 27, as those accepted to date by the sectional committee.

These definitions were determined upon after considerable labor and consultation. They were not submitted as recommended practice at the meeting, because it was thought best that the members have time for study and criticism. The association's committee on nomenclature includes F. E. Eberhardt, Newark Gear Cutting Machine Co., Newark, N. J., A. F. Cooke, Fawcus Machine Co., Pittsburgh, F. E. McMullen, Gleason Works, Rochester, J. C. O'Brien, Pittsburgh Gear & Machine Works, Pittsburgh, and C. R. Weiss, Link Belt Co., Philadelphia.

Communications may be sent to T. W. Owen, 2443 Prospect Avenue, Cleveland, secretary of the association.

When a dimensional value is given to any of the following terms, it is understood that they are taken from dimensions based on theoretical conditions and proportions.

Addendum is the distance, normal to the pitch surface, from the pitch surface to the top of the tooth.

Arc of action: The arc of action is the angular distance a tooth travels from the point where it first makes contact with its mating tooth until it leaves contact. (Sometimes called angle of action.)

Active face is the length of the working surface of the teeth in the axial plane.

Arc of approach is the angular distance from the point where tooth contact begins to the pitch point.

Arc of recess is the angular distance from the pitch point to the point where tooth contact ceases.

Addendum angle is the angle between the pitch cone and the face cone in a plane containing the axis. (Also called the increment angle.)

Angular bevels are bevel gears which are to operate on shafts having an included angle other than 90 deg.

Backlash is play between teeth of mating gears.

Base circle is that circle from which a line is unwound to generate the involute curve.

Backing is the distance parallel to the axis from the crown to a shoulder or hub extension.

Back cone radius is the distance perpendicular to the pitch surface from the pitch line to the axis. (This distance is also called virtual pitch radius.)

Back cone is the cone generated by swinging the back cone radius about the axis of the gear.

Back angle is the angle included between the plane of the pitch circle and a plane tangent to the large end of the tooth. (Sometimes called the edge angle.)

Bottom land is the surface of the gear body between adjacent teeth.

Center distance is the shortest distance between the axes of mating gears.

Circular pitch is the distance on the circumference of the pitch circle between corresponding points of adjacent teeth.

Clearance is the shortest distance between the top of a tooth and the bottom of its mating space.

Circular thickness is the thickness of a tooth along the pitch line.

Chordal thickness is the length of chord subtended by the circular thickness arc.

Chordal addendum is the greatest perpendicular distance from the top of the tooth to the chord subtended by the circular thickness arc (Sometimes referred to as corrected addendum.)

Cone center is the apex of the pitch cone.

Cone distance is the shortest distance from cone center to any point on the pitch circle. (Sometimes called apex distance.)

Crown is the edge formed by the intersection of the face cone and the back cone.

Cone center to crown is the distance parallel to the axis from the cone center to the crown of gear.

Dedendum is the distance, normal to the pitch surface, from the pitch surface to the bottom of the tooth space.

Diametral pitch is the number of teeth divided by the pitch diameter in inches.

Dedendum angle is the angle between the pitch cone and the root cone in a plane containing the axis. (Also called the angle of decrement.)

Diameter increment for bevel gears is the amount added to the pitch diameter to obtain the outside diameter.

Face angle is the angle between a plane tangent to the top of a tooth and the axis

Gear ratio is the number of teeth in gear divided by the number of teeth in pinion, or number of threads in worm.

Helical gear is one in which the teeth are formed along a helix. (Helical gears may run on parallel axes, in which case one gear has a right hand helix while its mating gear has a left hand helix. Helical gears may also run on axes which are not parallel. In these cases the helices of both gears may be of the same hand. Such gears are commonly miscalled "Spiral Gears.")

Helix angle: The helix angle of a helical gear is the angle between the helix at the pitch line and the axis of the gear.

Herringbone gear is a gear composed of two helical sections, one right hand and the other left hand.

Interchangeable gear system is one which permits gears of any tooth numbers of the same pitch to run together.

Interference means contact between mating teeth at some other point than along the line of action.

Line of action is the line along which all contact between mating teeth occurs. (On correct involute gears this line of action is the common tangent to the base circles of mating gears. This line is also called the path of contact.)

Long and short addendum teeth have a longer addendum on the teeth of one member than on those of the mating gear.

Normal circular pitch is the distance on the pitch surface along a helix perpendicular to the helix angle of a helical gear from one tooth to the corresponding point of the adjacent tooth. (It is commonly miscalled the normal pitch.)

Normal diametral pitch is that which corresponds to the normal circular pitch.

Normal pitch: The involute normal pitch is the normal distance between two successive and corresponding involute tooth surfaces. (It is equal to the circular pitch multiplied by the cosine of the pressure angle.)

Normal pressure angle is the angle included between a line perpendicular to a normal tooth profile at a point on the pitch surface and a plane tangent to the pitch surface at that point.

Outside diameter is the diameter of the greatest circle which contains the tops of the teeth.

Pitch angle is the angle between a plane tangent to the pitch cone and its axis.

Pitch circle is the circle formed by the intersection of the pitch surface and a plane perpendicular to the axis.

Pitch diameter is the diameter of the pitch circle.

Pitch point is the point of tangency of the pitch lines of two mating gears.

Pitch line element is a line, curved or straight, on the pitch surface, formed by the intersection of the tooth and pitch surfaces.

Pressure angle is the angle between the line of action and a line tangent to the pitch surface at the pitch point.

Root angle is the angle between a plane tangent to the bottom of the tooth space and the axis.

Straight bevel gear is a bevel gear whose pitch line element is a straight line.

Shaft angle is the included angle between the shaft upon which a pair of bevel gears operate.

Top land is the surface of the tooth which is farthest from its supporting body.

Tooth bearing is the area of the working surface of a tooth which has contact with its mating tooth.

Tooth top is a line in the top land joining the tooth faces.

Tooth bottom is a line in the bottom land joining the tooth flanks.

Tooth face is the surface between the pitch line and the top of the tooth.

Tooth flank is the surface between the pitch line and the bottom of the tooth space.

Tooth fillet is the fillet at the bottom of the tooth flank joining the bottom of the tooth space.

Throat increment for worm gears is amount added to the throat diameter to obtain the outside diameter.

Undercut refers to that condition where part of the conjugate surface of the flank has been cut away.

Whole depth is the greatest depth of tooth space perpendicular to the pitch surface.

Working depth is equal to the sum of the addenda of mating gears. (It is also equal to the whole depth minus the clearance.)

TRUSTING THE PUBLIC

President Bedford of Standard Oil Co., and President Horner of Mahr Mfg. Co. Address Petroleum Institute

ST. LOUIS, Dec. 17.—The need of taking the public into their confidence, the adoption of a high code of business ethics and the adoption of a campaign of public information to escape a harmful Governmental regulation were among the subjects stressed at the session of the American Petroleum Institute, which was held at Hotel Statler, Dec. 11, 12 and 13.

A. C. Bedford, chairman of the board Standard Oil Co., said he believed the petroleum industry fundamentally deserves public confidence and that "the maximum of efficiency of service can be realized in so far as there is a minimum of Government interference with the business.

"Of course, the fact must be faced, and it is only fair to the public that we should make it clear to them that the oil industry is selling its products at prices less than the actual cost of production," continued Mr. Bedford. "Prices must move upward. No business can be maintained on this basis."

An earnest appeal for adoption of plans to obtain publicity for the oil industry was submitted by W. M. Horner, president Mahr Mfg. Co., Milwaukee, and this attracted considerable interest and favorable comment. A comprehensive campaign of education through the judicious use of printer's ink was advocated by Mr. Horner. "Maximum service and minimum waste will result to the public," he said, "by publishing institutional advertising copy in trade journals, a few well-selected periodicals and such leading dailies over the country as will create an interlocking circulation but a minimum of duplication."

"Quality—Service—Price," in the order named, should, he said, be the slogan of the industry in carrying out this unified, institutional educational advertising campaign for fuel oil.

The officers of the institute were re-elected as follows: President Thomas A. O'Donnell, chairman of board, California Petroleum Corporation; vice-presidents, R. D. Benson, chairman of board, the Tide Water Oil Co.; Henry L. Doherty, president, Henry L. Doherty & Co.; J. W. Van Dyke, president, Atlantic Refining Co.; treasurer, Harry P. Sinclair, chairman of board, Sinclair Consolidated Oil Corporation; secretary and counsel, R. L. Welch; assistant secretary and counsel, W. R. Boyd, Jr., and assistant treasurer, Lacey Walker.

Large Employee Vote Is Cast Under "The Bethlehem Plan"

Elections of employee representatives have been held recently at all the iron and steel and other manufacturing plants of the Bethlehem Steel Corporation, including the shipyards. The representatives chosen will take office on Jan. 1. It is noteworthy that at these elections no less than 87 per cent of the employees cast ballots. Employee representation has been in effect at Bethlehem plants for five years, but the recent election is the first in which there has been participation by the employees at the Midvale and Lackawanna plants which were acquired last year.

FEW ORDERS FROM JAPAN

Japanese Merchants Buy in Europe, but Larger Business Comes to United States—Oil Pipe Tonnage Placed

NEW YORK, Dec. 18.—While Japanese merchant orders placed with American mills continue small, reports of fairly heavy buying of small lots in Belgium and France continue. In the meantime, some of the larger orders from official sources and the larger companies seem to be, as a rule, coming to the United States. Chinese business is small and the few transactions noted are at low prices. Demand for second-hand material and wire shorts is about the only feature of this market.

An inquiry from Japan for oil can size tin plate, bids on which opened Dec. 17, specified 9500 boxes of 14 x 18 in. and 2800 boxes of 10 x 20 in., delivered Yokohama. Among recently opened railroad tenders is one for 100,000 tie plates from the South Manchuria Railway Co., opened Dec. 14, and a tender from Osaka municipality for a mile of 102-lb. girder rails. The tie plates are the second large lot purchased this year by the South Manchuria.

The 70 miles of 100-lb. rails recently purchased by this railroad in the United States, the order for which was duplicated and divided between a Belgian and a French mill, was awarded to the American maker on a January-February delivery basis. The 70 miles divided between Belgium and France is understood to have been placed with the Belgian mill at 82.16 yen per ton, c.i.f. Dairen, and with the French mill at 82 yen per ton.

The only large order from Japan reported in the past week was a total of 1500 tons of oil country pipe, purchased by the Nippon Oil Co. from Takata & Co. and placed with an American mill.

New Open-Hearth Furnace of Republic Iron & Steel Co.

The Republic Iron & Steel Co., Youngstown, is increasing its steel-making capacity by the addition of another open-hearth furnace to its complement at Lansingville, for a total of 15. The new unit will be of the same rated capacity as the other furnaces in the group, 85 tons per day, and will therefore increase the company's open-hearth capacity by about 30,000 tons per year. The new furnace will also increase the number of independent open hearths in the district to 52. It is being built at the easterly end of the open-hearth building.

Extensive repair work is under way at the company's Bessemer plant, designed to increase output and reduce production costs. One of the company's blast furnaces at Haselton is also being rebuilt and enlarged. An addition to its by-product coke oven battery, which will make it self-contained in the matter of coke supply, is nearing completion.

The Mahoning Valley Water Co., which supplies a number of steel properties and other industrial concerns in the Youngstown district with water supply, plans extensions to its facilities involving outlay of $300,000. The company will erect a new filtration plant, and will create several new reservoirs. The Youngstown Sheet & Tube Co. and the Republic Iron & Steel Co. are among its chief consuming interests.

BOOK REVIEWS

Commerce Yearbook, 1922. Compiled under the direction of the Bureau of Foreign and Domestic Commerce. Pages 691 + v. Washington, Government Printing Office, 1923. Price, 60c.

Issued more promptly than is customary in Government publications of so pretentious a scope, this book contains a vast amount of information covering general business conditions in the year 1922 and the early months of 1923, with particular reference to the revival of production, to sales, unfilled orders and stocks of manufactured commodities, to employment, immigration and wages, and to a considerable number of specific industries, as well as transportation, banking, agriculture and the foreign trade.

Among the individual industries covered are coal and coke, petroleum, electric light and power, iron and steel, non-ferrous metals, building materials, machinery and railroad equipment, lumber, electrical equipment, agricultural machinery, foodstuffs, textiles, leather, pulp and paper, automobiles, rubber and chemicals. Each of these key industries is treated in some detail, with price and production statistics drawn from recognized trade sources and illustrated by numerous diagrams showing general trends and recent conditions. In many cases, world production has been shown as a complement to the output of the United States and our proportion of the total given in some detail.

Under the heading of iron and steel, which occupies 14 pages in the book, quotations are made freely from THE IRON AGE, particularly with regard to production of steel and iron by the five leading nations, the monthly production of pig iron and steel ingots during 2½ years, index numbers of composite finished steel prices compared with wholesale prices of all commodities, prices at Pittsburgh of various grades of pig iron over a period of years, etc. In the summary on this industry, it is pointed out that, since the marked decline in 1921, the industry has had a steady recovery. Prices advanced consistently during 1922, though the year's average was lower than for 1921. Under the heading of exports of iron and steel, it is shown that the outward movement in 1922 was less than in 1921 and was less than two-thirds the tonnage in 1913.

All in all, the statistical review of the year as covered in this book is such as will be preserved for reference, largely because of the authoritative character of the figures presented, but also because of the great amount of material, the great diversity of topics and the widespread character of the figures, covering as they do most of the important nations of the world, both as to production and as to exports and imports. This is the first issue of the "yearbook."

Cost Control for Foundries. By Frank Everitt and Johnson Heywood. Edited by William R. Basset. Pages 226, 6 x 9¼ in.; illustrations, 72. Published by McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, $3.

If there is any one line of industry needing good costing, especially to aid estimating, it is the foundry business; which commercial agencies show to be a specially bad credit risk, on account of the numerous and serious failures therein.

The authors, and the editor, have rendered a service to foundrymen by producing a work so free from accounting technicalities and so readily understandable by foremen and cost clerks. The typography of the text and the press-work are of McGraw-Hill excellence; but most of the forms, photoengravings of pen drawings, are almost illegible. There are few sins of commission; many, however, of omission, which should be remedied in deserved new editions.

Going into details instead of making a general criticism: Considering manufacturng expense to be made up of only melting and core costs (page 139) is unusual; perhaps not safe. In another edition a method of accounting for customers' so-called defectives might be given with advantage. The distinction between amount and percentage of overhead is not sharply enough drawn. The subject of the cost period might receive more attention, especially in view of the fact that advanced practice makes that of the melting department only 24 hr. A very important factor in overhead—rent—receives no mention. No solution is offered for the problem (page 128) of allocating core costs. No method of properly distributing crane expense (for instance where the same crane hauls flasks to and fro, molten iron in, and castings out) is given. Drawings, which in some foundries are a considerable expense item, are not taken care of. One very important item in foundries is that of burning on and welding defectives and crediting the restored pieces and charging the cost of restoring.

The advantages of distributing expense according to direct-labor hours instead of direct-labor cost are not stated; and in view of fluctuating wages and the varying purchasing power of the dollar, this should be of importance in preparing estimates on repeat jobs. Sufficient stress is not laid upon the desirability of keeping time on piece work—a matter in which foundrymen are especially lax and even obstinate. More attention might have been given to such matters as time recording where the same hand works part of the time on piecework, part by the hour.

That the physical inventory should be made only when the stock falls to a minimum is not always either feasible or desirable. That the inventory must increase with business expansion is not necessarily so—for intance, where the product has been standardized, the inventory is often less in both variety and amount. No provision is made for steel foundries that use a converter with the cupola. One of the attributes of a good and serviceable cost system is omitted—records that are untamperable, up to date, and regularly and frequently used.

Selling expense should be more minutely analyzed to show the comparative percentages of selling cost in various districts, on various products, and by different salesmen. While sales expense is analyzed, purchasing expense is not. ROBERT GRIMSHAW.

New Books Received

Frederick W. Taylor, Father of Scientific Management. By Frank Barkley Copley. In two volumes. Pages 465 and 472, 9 x 6½ in., illustrated. Published by Harper & Brothers, 49 East Thirty-third Street, New York. Price $10.

Business Fundamentals. By Alvin T. Simonds. Pages 221, 5 x 7½ in. Published by Ronald Press Co., 20 Vesey Street, New York. Price, $2.25.

Transactions American Society Heating and Ventilating Engineers. Volume 27. Pages 416, 6 x 9 in., illustrated. Published by the society, 29 West Thirty-ninth Street, New York.

Modern Gas Producers. By N. E. Rambush. Pages 545, 7 x 9½ in., illustrated. Published by Benn Brothers, Ltd., 8 Bouverie Street, London, E. C. 4. Price, 55s., net.

Structural Steel. Handbook No. 19 of Sizes, Extras, Code Words, etc. Pages 122, 6¾ x 8¾ in., illustrated. Published by A. Skelton & Co., Moorgate Station Chambers, Moorfields, London, E. C. 2. Price, 5s.

The Properties of Electrically Conducting Systems. By Charles A. Kraus. Pages 415, 6¼ x 9¼ in.; 70 figures. Published by Chemical Catalog Co., Inc., 19 East Twenty-fourth Street, New York. Price, $4.50.

Motor Fuels, Their Production and Technology. By Eugene H. Leslie. Pages 681, 6¼ x 9¼ in.; 166 figures, 121 tables. Published by Chemical Catalog Co., Inc., 19 East Twenty-fourth Street, New York. Price, $7.

Catalytic Action. By K. George Falk. Pages 172, 6¼ x 9¼ in. Published by Chemical Catalog Co., Inc., 19 East Twenty-fourth Street, New York. Price, $2.50.

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ESTABLISHED 1855

THE IRON AGE

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C. S. BAUR, *General Advertising Manager*

Member of the Audit Bureau of Circulations and of Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

F. J. Frank, *President* PRINTED IN U. S. A. George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 243 West 39th Street, New York. H. M. Swetland, *Pres.* Charles G. Phillips, *Vice-Pres.* A. C. Pearson, *Treas.* F. J. Frank, *Secy.*

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: 410 Unity Building. Philadelphia: 1420-1422 Widener Building. Cleveland: Guardian Building. Detroit: 317 West Fort St. Cincinnati: First National Bank Bldg. Buffalo: 833 Ellicott Square. Washington: 26 Jackson Place, N. W. San Francisco: 320 Market St. London, Eng.: 11 Haymarket, S.W.1.

Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50; Foreign, $12.00 per year. Single copy 25 cents.

Entered as second class matter, June 18, 1879, at the Post Office at New York, New York, under the Act of March 3, 1879.

Working and Spending

A REVIEW of business conditions by a financial writer last week began by referring to the advent of winter weather as a stimulant to retail trade. The public showed a good spending power.

Such emphasis upon the volume of spending, relative to the amount of work done, is not uncommon. It is true the reviewers refer also to the quantity of employment, and in 1920 they made much reference to inefficiency. Lately they have given less attention than is meet to the increase in efficiency. The amount of work done is, of course, affected by both factors, the amount of time put in as shown by employment statistics and the degree of efficiency in the use of that time.

It might be argued that spending is necessary, since unless money is spent there is no demand for goods and goods therefore do not need to be produced, hence spending makes work. That, however, is putting the cart before the horse.

It is a common error, in efforts to reason things out, to confuse cause and effect. Work produces spending power and spending produces work. The question is which is the more important of these two couples, in making for progress and prosperity. Recourse must be had to the attitude or conduct of the individual. The ordinary individual, and few but misers can be excluded from the category, spends his money in one way or another, and rather speedily. The spending may be indirect, as, for instance, through the purchase of bonds or shares of a corporation which engages in construction work.

The greater the quantity of efficient work that is done the greater will be the progress and prosperity. Spending in construction work, whereby power will be produced more cheaply, transportation will be improved, or goods will be produced more economically, is, of course, in an entirely different category from spending in retail stores. Even there, however, the long range economic benefit of things coming to be done better is more important than the employment temporarily given. It is better to build an additional highway than to have an earthquake necessitating the rebuilding of a highway, though the amount of employment given is the same.

This nation has been trying to study economics in recent years. Public spirited men desire to further the study and to encourage right thinking. It is doing good service to criticize the mental attitude that lays emphasis on spending rather than on working. Statistics of spending are useful as furnishing proof—more or less—of prosperity, but the spending should not be considered a cause of prosperity.

The various indexes of business are considered very valuable, and are studied carefully. As a matter of fact, however, their direct showing is chiefly of the volume of trade at the moment. The volume alone does not determine the amount of progress being made. The character of the work enters into the equation. If we all worked very hard producing food and clothing the car loadings might be heavy and the bank clearings large, but the next generation would be worse off than we. What we want, to put it in arithmetic, is that in time we shall have to work only three-fourths as hard, yet have the same comforts, or work just as hard and have one-third more comforts. To supplement the indexes showing the volume of business we need more inquiry into the nature of the work done, in respect to its putting us in better condition in future.

High Cost of Manganese in 1923

THERE have been two noteworthy developments in the manganese market in 1923. One is the heavy importation of ferromanganese despite the highest tariff in the history of the industry. Figures given last week in THE IRON AGE show that the import rate to Nov. 1, this year, of 8245 tons per month exceeds any since 1913, when the receipts of 10,672 tons per month represented about one-half the consumption of that alloy. Along with the large import movement this year has been a domestic production close to some of the war records.

The other development has been a domestic production of ferromanganese far in excess of what would be indicated by the year's ore receipts. Or, to use figures, the output of ferromanganese up to Nov. 1 represents an ore consumption in the ten months of 300,000 to 350,000 tons more than the manganese ore importations in that period, which have been the smallest in eleven years. It is estimated by domestic producers of

ferromanganese that substantially all the difference between ore imported and ore consumed is foreign ore that was on hand at furnaces at the beginning of the year—stocks that had been accumulated before the high duty on manganese ores went into effect.

The claim has been made that the manganese tariff of 1 cent per pound of contained manganese that became effective Sept. 22, 1922, has stimulated the domestic production of higher grade ores and that these ores have made up the apparent deficiency in ore imports. The fact is, however, that the leading producers of ferromanganese have not been buyers of domestic manganese ores in the period in question. Moreover, evidence has not been given as yet of the domestic production in the past year of ores of the requisite quality in appreciable amounts.

The operation of the high duty on manganese ore and the corresponding high duty on ferromanganese has been what was pointed out in these columns when these tariffs were under discussion. The predicted development of domestic manganese mines has not taken place, but the tariff has added to the cost of every ton of steel produced. More ferromanganese has been needed and consumed in 1923 than in any year in the last eleven, apart from the war peak, but at a higher cost to the steel industry than has ever been known under peace-time conditions.

Zeal Without Knowledge

THE final chapter is about to be written in the history of the Inter-Church World Movement of North America, for the organization thus officially known has asked permission from one of the courts in New York to dissolve the corporation. The newspaper account of this action says:

> The petition filed yesterday by the directors explains that the corporation was organized for the promotion of charitable and religious purposes. This purpose was to be accomplished by a spirit of cooperation and action between the churches of denominations in this country. The directors give as the reason for the desired dissolution of the corporation that it has been "discovered by the board that its objects could not be accomplished in the particular manner undertaken by the corporation."

There were various causes for the failure of the movement with which thousands of men of good intentions were connected, some directly and actively and many others as financial contributors only. One trouble was the lack of business arrangement; and the extravagance that prevailed was astounding. But the main trouble was that in many of its activities the organization was neither charitable nor religious. It was decidedly uncharitable in misjudging and misrepresenting business men, particularly the leaders of the iron and steel industry, and the position taken at the time of the steel strike of 1919 was absolutely inconsistent with any genuine religious purpose. The good men who were nominally responsible for the alleged investigation and report allowed themselves to be used by socialists and near-socialists who were perfectly happy in consorting with William Z. Foster and other dangerous agitators. In the voluminous report of the Inter-Church investigators, the operations of Foster were treated as not deserving condemnation and the determination of Foster and his ilk to get possession of the steel industry was belittled.

The whole story of this movement is a sad one. Some of the labor leaders who trained with Foster have seen the light and know now that the "boring from within" was not only dangerous to the union but destructive to democratic government. These labor leaders, of whom the most conspicuous is Samuel Gompers, have been fiercely denouncing Foster during the past year, but the leaders of the Inter-Church movement have not yet acknowledged that they were in error. It is well that an organization having such leaders should be dissolved with the passing of the old year. If the churches should ever again be united for charitable and religious purposes or for any other worthy object, may they have wiser leadership and adhere to their avowed purpose.

New Steps in Compensation

THE new British accident compensation act which will go into effect on Jan. 1 contains concessions to labor which involve no radical changes in principle and from a money standpoint seem moderate enough when compared with the standards of the compensation acts of the United States. There was a sharp fight in Parliament and the result is a compromise. The United States has followed Great Britain so closely in such legislation that whatever is done across the water has come to be regarded as handwriting on the wall. In this particular instance, however, there appears to be little that could not be adopted here without imposing new burdens upon industry.

The exception, perhaps, lies in the important change, from the American standpoint, of reducing to three days the waiting time before compensation begins. That is to say, any injury that keeps an employee away from his work for three days or longer must be paid for in compensation. For disability of less than three days he gets nothing. If his disability lasts for more than four weeks, compensation dates from the beginning, including the three days. Labor fought hard to get pay for even one day of idleness. Employers fought as hard for the seven-day period which has prevailed since 1906.

Probably 75 per cent of all accidents in industry permit of a return to work within seven days. When compensation was first established in Great Britain and the United States ten days was the usual waiting period. Now it has decreased almost everywhere to seven days and one State has got down to five days. The three days of the British act is a long step toward no days at all.

Compared with American practice the new British limits of award do not seem large, to say the least. The maximum compensation in case of death is increased from £300 to £600, the minimum from £150 to £200. Also, instead of basing the award wholly on previous earnings, regardless of the number of dependents, hereafter where a widow is left, or a child over 15 years, and there are younger children, additional provision is made for the latter until they have reached the age of 15.

Weekly payments for disability are increased 50 per cent, and somewhat more than that where wages average less than 25 shillings a week. Labor contended for a 66 2/3 per cent advance. The maximum weekly compensation is increased from £1 to 30 shillings, which roughly is $7.30. This is much less than is paid in many cases in the United States—by comparison almost trifling. Another change excludes from the provisions of the act all employees whose average wage is more than £350 a year, say $1,700. The old limit was £250. In the United States no employee is excluded from compensation. The injured man may be a laborer earning $3 a day or the general manager with a salary of $50,000. If the accident occurred in the course of and as a result of his employment he is entitled to compensation. But the law sets a limit beyond which an award may not go.

The British engineering press criticizes the changes made as to cases in which there shall be no compensation. The act of 1906 was intended to eliminate all defense on the ground of serious and wilful misconduct. Nevertheless, employers had considerable success in setting up as a defense that when a worker who was injured did something he was ordered not to do, he had gone outside the scope of his employment and therefore the accident did not arise "out of or in the course of his employment." Under American compensation acts this defense has not worked out well. The breaking of a rule has not generally been considered a sufficient reason for denying compensation, unless there were other circumstances, such as drunkenness.

The advocates of the new British act contended that the defense that a rule had been broken had wrought hardship in many cases to workers or their dependents, since, although breaking the rules, the workers did so in what they considered the best interest of their employers. As a consequence the new law particularly provides that an accident resulting in death or serious or permanent disablement shall be deemed to have arisen out of or in the course of the employment, notwithstanding that the workman at the time of the accident was acting in contravention of a regulation or of his employer's orders or without instructions, if his act was done for the purpose of or in connection with his employer's work or business. Critics of the law assert that this provision will result in wholesale litigation. In this country such has not been the experience.

IN view of the present good condition of business generally, the prediction made 10 months ago by Prof. E. W. Kemmerer of Princeton University is of interest. In an article written last February he predicted that the crest of the business cycle would be reached probably in the early part of 1924 or possibly in the latter part of 1924. "During the year 1923," he said, "or at least during the greater part of it, we shall be moving toward the crest of the 'business cycle wave,' but the crest will not be so high nor will the succeeding trough be so low as during the last business cycle."

Decisions on Trade Associations

ON another page is given the substance of the decree filed by Judge Knox in the United States District Court of Southern New York in what is known as the cement case. The defendants were members of the Cement Manufacturers' Protective Association.

A decree in an equity case brought by the Government under the Sherman act is intended to prevent continuance of the evils which the court found had been caused in the past. All-important to the understanding of the decree, moreover, is the court's finding which preceded it. In the cement case, in which the decree was filed on Dec. 13, over seven weeks after the giving of the court's opinion, the findings against the association were sweeping.

In substance, Judge Knox held that the statistical system involving about 40 forms, reports upon each contract let, provisions for checking, practices about quotations, etc., was in effect the continuation of arrangements in an earlier association and that the result was material limitation upon competition in interstate commerce. The decree is accordingly a series of prohibitions, declaring that the Cement Manufacturers' Protective Association is dissolved and that in the future the members shall not do the specific things they did in the past with unlawful effect.

In November, however, the Department of Justice participated in a decree which undertook to tell defendants what they could do without running afoul of the Sherman act. This was the consent decree in the tile case, mentioned in THE IRON AGE of Dec. 6. Even that decree cannot be applied broadly. It ended a case in which the Department of Justice alleged manufacturers had entered into association activities the principal function of which was to fix and maintain prices. The means used to this end were rather complex, and included statistical reports of one kind and another. When the Department of Justice came to consider the decree it would like, it may have set limitations imposed because of past misconduct rather than by reason of any decisions construing the anti-trust laws.

However that may be, the fact remains that the tile case was ended with a consent decree. That means the decree establishes no new legal principles. It was not the first of its kind, in attempting to set up what particular defendants might do in the future without offending the law. It had been preceded by the consent decree in the gypsum case, last January. Neither decree settled anything new, as a matter of law, for members of other industries.

In a decision handed down by the Supreme Court on Dec. 10, there was some interpretation of the Sherman act, and not in accordance with the views of the Department of Justice, either. Last January the department proceeded against the National Association of Window Glass Manufacturers and the union of handblowers. The attack was based on the wage scale contract agreed upon by representatives of the manufacturers and representatives of the union. It allowed each manufacturer only a limited amount of running time during the year, and the allow-

ance was enforced by the union.

Legality, the court said, turns upon the particular facts of a case. The dominant fact was that machines have come into use and make unnecessary the employment of highly trained blowers and gatherers. Machine production is at half the cost of hand-made glass. Machine production fixes the price of glass, and arrangements by the manufacturers and their employees could not have any effect. Besides, there were not enough workmen to man all the factories, probably because the hand industry is disappearing, and the purpose of the arrangement was to divide the available labor equally among the plants. The facts, consequently, in the opinion of the Supreme Court, showed "no combination in unreasonable restraint of trade in the arrangement made to suit the short supply of men."

It is upon the facts, it will be noticed, that the Supreme Court lays emphasis in each case. It is not to be overlooked, however, that various forms of activity interdicted in the case of the cement manufacturers are closely paralleled in the operations of other associations that as yet have not felt the weight of Government displeasure.

CORRESPONDENCE

How Can America Help Europe?

To the Editor: America ought to help Europe, not merely out of altruistic considerations but purely for self interest, if nothing else. It is foolish to imagine that we can erect a wall around ourselves and live prosperously and happily inside of it, washing our hands of the mess in Europe. Modern civilization and commerce are too complex to permit anything like that. Nations long ago ceased to be economically independent. The United States has not become unlinked from other countries, nor should it aspire to be if there is merit in the economic principle of the international division of labor, which we know there is. Certainly the American copper and petroleum producers and the wheat and cotton growers are under no illusions respecting independence from Europe.

Now, the United States has helped Europe a great deal. We went into the war at the expense of many thousands of lives and many billions of dollars. It is ungracious of us to assert that our armies saved the day, but there should be no dissent from the representation that Great Britain and France were able to carry on only by virtue of the goods that we supplied to them.

Following the Armistice we let the Allies have a great deal, their credits not becoming exhausted until about the middle of 1920, and it is certain that if that post-war assistance had been utilized wisely Europe would be now far better off. Even later we helped financially by our huge purchase of German marks, which was indirectly to the advantage of our Allies by enabling Germany to pay something on the account of reparations, which otherwise might have been impossible.

It would be untrue for any one to allege that America had not been financially most generous to Europe, and it would be difficult to prove that any further financial assistance would do any real good to Europe.

What, then, can America do now for Europe? Some people say that we should join the League of Nations and thereby help to dispel the specter of strife and war and by the promise of peace give Europe a chance to recuperate. Every one subscribes to the desirability of abolishing the nightmare of war, but it is doubtful whether the League of Nations would accomplish any such thing. In the meanwhile there has happened something far more effective for curbing warlike spirit, and that is the repudiation of debts.

Formerly governmental obligations were looked upon as something inviolable, and up to the Bolshevik revolution in Russia people cheerfully and confidently subscribed to foreign loans. We have learned, however, that a loan to a foreign country may be a very insecure thing. We were perhaps prepared for repudiation by the Bolsheviks, but the intimations that we are now getting from France give us a shock. If any country, other than Great Britain, is meditating future wars it will have to do a great deal of convincing before it can get any aid from abroad. As for the British I do not think that they want to go to war any more than we do.

Other people say that we ought to help Europe by giving our moral support and comfort and our intelligent advice respecting the arrangement of things. We have tried to do that, but the French government has been unwilling to let us except on terms that we thought would make us a cat's paw.

There is, of course, a great thing that we could do for Europe, which would be to arrange our own affairs so as to let the people of Europe work for us, which would be to our own advantage; but that is something that is too complicated economically for our people to see and they are not yet ready for it.

Thus, we seem to have exhausted thoughts as to how we might help Europe; but in the *Atlantic Monthly* for December Dr. Gustav Cassel, who is the most distinguished figure of the present time among European economists, offers one that is new and novel. Dr. Cassel argues that the French are trying, for selfish interests, to ruin Germany economically, which is adverse to the interests of the rest of the world. He refers to the French representations that France cannot pay her indebtedness to Great Britain and the United States except out of surplus of German reparations, which he alleges the French do not expect to get. He proceeds then to point out that the French contraction of indebtedness was in no way contingent upon anything else, which of course is the truth. Dr. Cassel concludes with the recommendation that the greatest help that America can give to Europe in straightening out its tangled affairs is to discard all sympathy for the present attitude of the French toward Germany and to press the French for arrangements for the payment of their debt to us. The latter is just what Senator Borah is now urging Secretary Hughes to do.

Dr. Cassel's paper to which I have referred is highly important and intensely interesting. It is impressive that leading economists of Europe and America take views respecting the economic situation in Germany that are practically identical. There is really no great need for an international investigation of Germany's capacity to pay except for official elucidation and political effect. The experts already know nearly enough what will be the answer.

In brief, the answer must be that Germany's capacity to pay is uncertain, but that a definite sum must be named that is reasonable. Nobody who is penalized will work wholeheartedly to free himself from an indefinite obligation or one that is impossible to meet. Germany's capacity to pay is uncertain because it depends upon the work and production that the German people are going to do and make and the extent to which they can curtail their living expenses. These are in turn dependent upon conditions that their conquerors are going to impose. All of these things are factors of the future, not of the past. A factor of the past is the amount of wealth that the Germans have transferred to foreign countries and the amount of business that the German people are doing extra-nationally, upon which the French have put so much emphasis. Without any doubt there has been, and is, a good deal of that; but economists find it difficult to conceive that it can loom very big in the picture as a whole. The commission to which the French have recently agreed, on which the United States is to be unofficially represented, can do useful work in exploring and bringing out the truth of that subject.

New York, Dec. 14. W. R. INGALLS.

ENGINEERING AND MANAGEMENT

Best Management Preceded by Good Mechanical Engineering—Preparation for Time Studies

That good mechanical engineering is essential to good management in the metal-working industries was emphasized by Robert T. Kent, consulting engineer, Montclair, N. J., in a paper on "The Mechanical Engineering of Management in the Metal-Working Trades," presented at the management session of the annual meeting of the American Society of Mechanical Engineers, held in New York Dec. 6. The best engineering principles, it was pointed out, must be applied to the design of the product, the arrangement of the plant, and the selection of equipment and methods.

Management was stated to have in the past ten years become symbolized by certain mechanisms, among these being time studies, routing or order-of-work schemes, stores systems and piece-work, premium or bonus plans for wage payment. These, it was said, may be quite necessary to the best management in the plant, but their presence does not necessarily indicate that good management exists. Many of the so-called failures of scientific management were attributed to the confusing of the idea of management with the carrying out of the idea.

As an example, time study and rate setting was cited, and it was indicated that frequently no attention was paid to the preliminaries that should precede the time study itself, nor to the other equally important phases of management which are necessary to the promulgation of its results.

"There is little use in making time studies on operations where the methods are wrong, or the machines in poor condition or improperly operated," said Mr. Kent. "Operation times from such studies are sure to lead to trouble later. To assure accuracy in time studies we must have the machines in perfect order, the cutting tools made to given standards, adequate power, and high class operation. The first three items are distinctly up to the engineer.

"Assuming that the time studies have been made under the proper conditions, their results will be of little value unless these conditions are reproduced throughout the shop. Here again the engineer must function before the mechanism of management may be successfully applied."

The sequence to be followed in the installation of scientific management, as laid down by F. W. Taylor, was quoted. This sequence was: *a*, Establish a stores system; *b*, perfect the product; *c*, put the shop equipment in proper condition; *d*, organize and train a maintenance department; *e*, develop the functional organization and the routing system; and *f*, make time studies and set rates.

"It is a sorry fact," said Mr. Kent, "that too often this sequence has been reversed, and that time studies have been started before adequate preparation for them has been made."

Having called attention to the amount and character of engineering work that must be done before even the best known mechanism of management, time-study, can have permanent value, Mr. Kent undertook to show how the effectiveness not only of this particular mechanism but of all others is affected by the engineering work that should precede their application.

As to the effect of engineering on the product, it was pointed out that after designing the product so that it is readily saleable in competition with that of other manufacturers, every change in design that simplifies the process of manufacture, simplifies the management of the plant. The problem of the mechanical engineer, it was stated, is first to ascertain whether or not the design can be improved from the standpoint of fewer parts, and secondly whether the design of the individual parts is such as to permit of the minimum number of machine operations. Consideration of the possibilitity of substituting purchased standard parts for parts made in the shop was also brought out.

Faulty plant arrangement as hampering good management was emphasized, and it was stated that a prolific field for the mechanical engineer was in the study of the plant layout, and the arrangement of its facilities in the most convenient form. The question of power was pointed out as bearing an intimate relation to production and management, the subject being said to include not only the power plant but also the power actually available at the cutting tools. Causes of inadequate power which were removed by the establishment of a proper routine of maintenance were given, and the prevention of equipment failures by having regular maintenance as part of the shop routine was emphasized. "It may be set down almost as an axiom," said Mr. Kent, "that shop maintenance is one of the fundamentals of good shop management."

Methods and Equipment

In connection with methods and equipment, it was stated that the function of the mechanical engineer in laying the foundation for good management is first to devise the best method to accomplish the desired end, and then to provide the equipment which will best carry out that method.

"In the case of a new shop, or a shop with ample funds for changing the existing equipment, the task," he said, "is comparatively simple. Where the engineer is limited to the equipment on hand his ingenuity may be severely taxed. Nevertheless he can accomplish much with a comparatively small expenditure of funds. If a change in method is proposed it must stand the test that the economies effected thereby will pay the cost of the change in a reasonable time, and the new method thereafter return a profit on the investment. The return on the investment need not necessarily result from a lower cost of doing the work. It may come from releasing equipment that can be put to more profitable use."

In dealing with equipment it was said that standardization is a powerful ally of production. Machines that are supposed to do the same work should be capable of the same standard of performance. Neglect of such small details as the shape of cutting tools and their proper hardening was emphasized as having a great effect on production.

In conclusion, Mr. Kent said that it had been brought home to him many times that the self-evident things are frequently the most neglected ones, and that before real management can be attempted there is much that must be done in the way of good old-fashioned mechanical engineering.

Judge Huggins Addresses Employers' Association of Eastern Massachusetts

Declaring that what is needed in this country more than anything else is common law of industry, William L. Huggins, former justice of the supreme court, Topeka, Kan., a guest of the Employers' Association of Eastern Massachusetts at its sixth annual meeting held Wednesday, Dec. 12, at the City Club, Boston, said we are slowly developing one. "But what we need," he said, "is statutes against picketing and other things—statutes to meet changed industrial conditions."

Judge Huggins told the members of the organization they had a great responsibility; that it was up to them to fight for the right of a man to work. "We must," he said, "build up in this country a respect of law, order and of constitution." Three great fundamentals have been developed during the past 700 years, according to Mr. Huggins—individuality, equality and property. "There is no room for debate on this fact among men who believe in American institutions. A powerful minority debates it, however, particularly through the legislative field. That organization denies liberty to labor. Labor is a man's personal property, but this organization says he has no right to personal property."

L. Ross Gottleib, National Industrial Conference Board, New York, also was a guest of the organization. Mr. Gottleib asserted that the standard of living in this country will be reduced before long if taxation continues to increase as it has in recent years. Stress was placed on the huge sums of money spent for education in this country and its relation to taxation. He

said that of New York's 1924 budget, 35 per cent will be spent for education. Mr. Gottleib declared he was not against education, but he believes education places one of the greatest burdens on the taxpayer.

At the business meeting prior to the dinner A. N. Murray, Murray Printing Co., Cambridge, Mass., was elected president to succeed George M. Gray, Peter Gray & Sons, Inc., Cambridge. Mr. Gray automatically becomes a member of the board of managers. Dr. R. S. Quinby, Hood Rubber Co., Watertown, N. Y., succeeds H. L. Baxter of that company as a member of the board. Otherwise officers and members of the board remain as heretofore.

Detroit Tool Manufacturers' Association

Don F. Kennedy, president and general manager of the Sterling Mfg. Co., was elected president of the Detroit Tool Manufacturers' Association at its first meeting, held at the Detroit Athletic Club, Dec. 11. The association started with a membership of some 30 of the larger tool manufacturers of Detroit, most of whom are engaged in the manufacture of tools, dies, jigs and fixtures for the automotive industry. The following other officers were also elected:—vice-president, E. P. Kramer, of F. Jos. Lamb Co.; secretary, N. A. Woodworth, of Ex-Cell-O Tool & Mfg. Co.; treasurer, O. H. Siewek, of Siewek & Snyder Tool Co. The officers with W. D. McKenzie, of Trio Tool Co., constitute the board of directors.

New York Steel Treaters

At the regular monthly meeting of the New York Chapter of the American Society for Steel Treating, Wednesday evening, Dec. 19, Stanley P. Rockwell, consulting metallurgist, Hartford, Conn., gave an address on "Measurement of Carbon Penetration in Carburized Steels."

For the January meeting a joint session with the New Jersey Chemical Society has been arranged for Monday evening, Jan. 14, at Stetter Restaurant, Newark, N. J.

National Association of Brass Manufacturers Meets in New York

The National Association of Brass Manufacturers held its annual convention at the Hotel Astor, New York, on Thursday, Dec. 13, electing John B. Brazier, Powhatan Brass & Iron Works, Ranson, W. Va., as its president, succeeding Karl Legner, Haines-Jones-Cadbury Co., Philadelphia. H. F. Albers, Globe Brass Mfg. Co., Cleveland, was elected first vice-president and R. L. Ottke, Standard Sanitary Mfg. Co., Pittsburgh, was elected second vice-president. William M. Webster, Chicago, continues as commissioner.

Retiring President Legner, in his introductory remarks, discussed the business situation in the plumbers' brass goods field. He said that business began showing a slight stagnation about last July or August, but that there are now signs of a revival that will come not later than spring. He based this prediction on expectations of continued building construction on a large scale. He discussed also the tax proposals of Secretary of the Treasury Mellon and the soldiers' bonus question, voicing the attitude of the association in favor of the former but opposed to the latter. The association framed a telegram to President Coolidge, of which a copy was sent to Secretary Mellon, approving the President's stand on these matters in his recent message to Congress.

A good deal of time was spent by the members in discussing the cooperative catalog which the association has published for some years, especially the giving of list prices on standard items of plumbers' goods. The views of all members were that nothing should be done which would violate the rulings of the Government and United States courts in the matter of uniformity of prices among competitors. Commissioner Webster said he had gone into the subject thoroughly, had consulted learned counsel, and gave it as his opinion that the printing of list prices in the association catalog was in no way a violation of any law, inasmuch as each manufacturer has his individual discounts which he quotes to the trade without regard to what competitive manufacturers may be quoting. The members were strongly in favor of continuing the publication of the cooperative catalog providing it can be done without subjecting the association to any Government criticism or complaint.

New Home of Detroit Engineers

The members of the Detroit Engineering Society on Dec. 15 celebrated the opening of their new home at 478 Alexandrine Avenue West, Detroit. The house, a large brick structure, which, with the property, is to cost nearly $60,000, is the first home the society has owned during the 28 years of its existence. The society was organized in 1895 as the Detroit Association of Graduate Engineers of the University of Michigan. In 1896 the by-laws were changed to broaden the scope of the organization, and membership was thrown open to graduates of all recognized engineering schools, and at the same time the name was changed to the Detroit Engineering Society. From an organization of half a dozen men, it has grown to an organization of 600 members. Officers of the organization are: L. E. Williams, president; Frank Burton and G. R. Thompson, vice-presidents; C. L. Snyder, secretary-treasurer; E. L. Brandt, managing secretary; O. H. Dawson and W. R. Kales, members of the executive committee.

General Meetings of Chamber of Commerce

Meetings of the Chamber of Commerce of the United States, national in interest, will be held in January in Philadelphia, Chicago, New Orleans and San Francisco. The first meeting will be held on Jan. 17 and 18 at Philadelphia, then at Chicago, Jan. 21 and 22; New Orleans, Jan. 24 and 25, and San Francisco, Jan. 29 and 30. The scheme is one of decentralization by establishing four general divisions in the country to enable a maximum number in different divisions to gather for the discussion of national topics, such as immigration and transportation. President Julius Barnes is expected to be present at all of the scheduled meetings.

The annual meeting will be held in Cleveland on May 5, 6, 7 and 8, though it had been hoped to use the new building of the chamber now in process of construction at Washington.

The Ohio State Teachers' Association, at its annual meeting to be held in Columbus Dec. 26 to 28, will consider whether an arrangement can be worked out with labor unions and employer organizations whereby the schools can better serve industry. The main address at this session will be delivered by W. E. Baker, employment manager of the Dayton Engineering & Laboratories Co., on "What Does Industry Expect of the Public School?"

COMING MEETINGS

January

Federated American Engineering Societies. Jan. 10 and 11. Annual meeting at Washington. L. W. Wallace, 719 Fifteenth Street, N. W., Washington, secretary.

American Society of Safety Engineers. Jan. 18. Annual meeting in New York.

Society of Automotive Engineers. Jan. 22 to 25. Annual meeting, General Motors Building, Detroit. Coker F. Clarkson, 29 West Thirty-ninth Street, New York, general manager.

American Society for Steel Treating. Jan. 31 to Feb. 1. Winter sectional meeting, Rochester, N. Y. W. H. Eisenman, 4600 Prospect Avenue, Cleveland, secretary.

Iron and Steel Markets

MORE DECEMBER BUYING

Chiefly in Automobile, Railroad and Structural Steels

Car, Locomotive and Tank Works Need Orders—Steel Works Schedules Maintained

Due to railroad, structural and automobile buying, December has been thus far a better month for the steel mills than was looked for, bookings being not far from the November rate. In the Central West there has been another week of activity in automobile steel.

Interest has centered in the contracts of the Ford Motor Co., which for the past week are put at close to 50,000 tons, including sheets. It is understood that its inquiries for 70,000 tons have not yet developed concessions from the 2.40c. price. At Cleveland a manufacturer of automobile parts has bought 12,000 tons of carbon steel and 6000 tons of silicon-manganese steel. Some large orders have been given also for steel of special sections for tire bases and wheel rims.

In general steel works have held to the operating schedules of the previous week, the Steel Corporation continuing on an 84 per cent basis. Youngstown mills are running somewhat fuller. Two blast furnaces there are to resume this week and the Bethlehem Steel Co. has added two furnaces to the active list.

An unusual amount of structural work is being figured on for this season of the year, and the large tonnage already on the books of the mills, notably the leading Eastern structural interest, points to great activity in 1924.

More than 33,000 tons of fabricated steel has been put under contract in the past week, two of the largest awards being 6500 tons for an office building in Cleveland and 5000 tons for a bridge at Perth Amboy, N. J., both going to the Bethlehem Steel Co. Pending projects call for more than 25,000 tons.

At Chicago the chief feature of the week in railroad buying was the placing of 102,500 tons of rails and 25,000 tons of track supplies by the Santa Fe system. Of the rails, 70,000 tons went to the Colorado mill. In track supplies the New York Central order for 75,000 kegs of spikes is outstanding. It is expected that the Burlington, Great Northern and Illinois Central will add to the rail contracts they already have placed.

Orders just placed by the St. Louis Southwestern and the Chicago & Alton total 1250 box cars; but the Chesapeake & Ohio has withdrawn its inquiry for 2000 gondolas because of the high prices quoted on the equipment specialties. Car, locomotive and tank works are at the point at which orders are needed if present working forces are retained.

The week's buying of automobile body sheets has confirmed the impression that users have been carrying light stocks. Some of the makers of full-finished sheets are now sold up for the first quarter.

Sheet sales in November by independent mills reporting to the Pittsburgh association were 165,000 tons, or 20,000 tons less than in October. Production at 188,000 tons was 37,000 tons less than in October. Unfilled tonnage on Dec. 1 was 280,000 tons, or about a month's capacity of the reporting mills, against 307,000 tons on Nov. 1.

Plates and bars are still the products on which the leading steel companies can make the best deliveries and in which the accumulation of backlogs is still something of a problem.

Eastern makers of bar iron now quote 2.30c., Pittsburgh, a reduction of $1 a ton, while bolt, nut and rivet discounts for first quarter contracts are on the basis of 60 and 10 per cent off for large machine bolts.

The largest transaction in pig iron was the purchase of 6000 tons of basic by a West Virginia melter, but as a rule buying has been confined to small tonnages. Most furnaces are pretty well provided with contracts for first quarter production and sellers are viewing the present dullness complacently. While prices lack firmness in some centers, few concessions by furnaces are reported, but some selling of Buffalo iron by brokers has been below recent quotations. Many foundries are preparing to close in the holidays for one or two weeks.

Further heavy buying of melting steel scrap reported in the Pittsburgh district has strengthened the market there, while the general tendency in other centers is still upward.

England has bought basic pig iron in Germany at about $20, f.o.b. Hamburg, which with freight added would be less than $1 below the parity of British iron.

Japanese demand in England for black sheets keeps up and deliveries are now running through March.

THE IRON AGE finished steel composite price remains unchanged, as does also the pig iron composite price.

Pittsburgh

Buyers of Steel More Inclined to Place Orders —Sentiment Increasingly Optimistic

PITTSBURGH, Dec. 18.—Resistance of buyers to steel prices gradually appears to be weakening, as is evident from the fact that the past week has registered a notable expansion in orders for almost all finished products. The automotive industry apparently has found the obtaining of supplies to be more important than the price and makers of automobile steels, particularly those producing full finished sheets, have all experienced a quickening in the demand. Some of the makers of the latter are now fully sold up for the first quarter of next year. An advance in the price of crude oil after a steady decline over several months has given pipe producers fresh hope. Independent makers of tin plate now appear to be as heavily committed as the leading interest, and the fact that low prices are disappearing in hot-rolled flats and cold-rolled strips makes it apparent that makers of these lines are better supplied with business than was the case recently. Real activity still is lacking in plates, shapes and bars, but there are indications that buyers are tiring of the effort to secure lower prices and are beginning to negotiate on today's basis.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Dec. 18, 1923	Dec. 11, 1923	Nov. 20, 1923	Dec. 19, 1922
No. 2X, Philadelphia‡	$24.26	$24.26	$22.64	$28.76
No. 2, Valley furnace†	22.00	22.00	21.00	25.00
No. 2, Southern, Cin'ti†	25.05	25.05	23.05	27.05
No. 2, Birmingham, Ala.†	21.00	21.00	19.00	23.00
No. 2 foundry, Chicago*	23.00	23.00	23.00	28.00
Basic, del'd, eastern Pa	23.25	23.25	22.75	27.50
Basic, Valley furnace	21.00	21.00	20.00	24.25
Valley Bessemer, del. P'gh	24.76	24.76	24.26	29.27
Malleable, Chicago*	23.00	23.00	23.00	28.00
Malleable, Valley	20.00	20.00	19.00	26.00
Gray forge, Pittsburgh	23.26	23.26	22.26	26.27
L. S. charcoal, Chicago	29.15	29.15	28.15	33.15
Ferromanganese, furnace	**109.00**	107.50	107.50	100.00

Rails, Billets, Etc., Per Gross Ton:				
O.-h. rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Bess. billets, Pittsburgh	40.00	40.00	40.00	36.50
O.-h. billets, Pittsburgh	40.00	40.00	40.00	36.50
O.-h. sheet bars, P'gh	42.50	42.50	42.50	36.50
Forging billets, base, P'gh	45.00	45.00	45.00	41.50
O.-h. billets, Phila	45.17	45.17	45.17	43.17
Wire rods, Pittsburgh	51.00	51.00	51.00	45.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	2.35	2.35	2.35	2.00
Light rails at mill	2.25	2.25	2.25	2.10

Finished Iron and Steel, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	2.62	2.67	2.67	2.275
Iron bars, Chicago	2.40	2.40	2.40	2.35
Steel bars, Pittsburgh	2.40	2.40	2.40	2.00
Steel bars, Chicago	2.50	2.50	2.50	2.10
Steel bars, New York	2.74	2.74	2.74	2.34
Tank plates, Pittsburgh	2.50	2.50	2.50	1.95
Tank plates, Chicago	2.60	2.60	2.60	2.30
Tank plates, New York	2.74	2.74	2.74	2.29
Beams, Pittsburgh	2.50	2.50	2.50	2.00
Beams, Chicago	2.60	2.60	2.60	2.20
Beams, New York	2.74	2.74	2.74	2.34
Steel hoops, Pittsburgh	3.00	3.00	3.00	2.75

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

Sheets, Nails and Wire, *Per Lb. to Large Buyers:*	Dec. 18, 1923 Cents	Dec. 11, 1923 Cents	Nov. 20, 1923 Cents	Dec. 19, 1922 Cents
Sheets, black, No. 28, P'gh	3.75	3.75	3.75	3.35
Sheets, galv., No. 28, P'gh	4.90	4.90	4.85	4.35
Sheets, blue an'l'd, 9 & 10	3.00	3.00	3.00	2.50
Wire nails, Pittsburgh	3.00	3.00	3.00	2.70
Plain wire, Pittsburgh	2.75	2.75	2.75	2.45
Barbed wire, galv., P'gh	3.80	3.80	3.80	3.35
Tin plate, 100-lb. box, P'gh	$5.50	$5.50	$5.50	$4.75

Old Material, Per Gross Ton:				
Carwheels, Chicago	**$20.00**	$19.50	$18.00	$24.00
Carwheels, Philadelphia	19.50	19.50	17.50	20.00
Heavy steel scrap, P'gh	**19.00**	18.50	16.50	20.00
Heavy steel scrap, Phila	**17.00**	16.50	15.50	16.50
Heavy steel scrap, Ch'go	**16.50**	16.00	14.00	17.50
No. 1 cast, Pittsburgh	19.50	19.50	18.50	22.50
No. 1 cast, Philadelphia	20.00	20.00	19.00	20.00
No. 1 cast, Ch'go (net ton)	**20.00**	19.50	18.50	20.00
No. 1 RR. wrot, Phila	18.50	18.50	17.50	19.00
No. 1 RR. wrot, Ch'go (net)	**15.50**	15.00	12.50	15.25

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$4.00	$4.00	$3.75	$7.00
Foundry coke, prompt	4.75	4.75	4.75	8.00

Metals, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Lake copper, New York	13.25	13.25	13.50	14.50
Electrolytic copper, refinery	12.87½	12.87½	12.75	14.37½
Zinc, St. Louis	6.20	6.25	6.30	7.00
Zinc, New York	6.55	6.60	6.65	7.35
Lead, St. Louis	**7.60**	7.37½	6.70	6.87½
Lead, New York	**7.75**	7.62½	6.95	7.25
Tin (Straits), New York	**47.25**	46.50	44.25	38.12½
Antimony (Asiatic), N. Y.	**9.00**	8.65	9.25	6.30

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Composite Price, Dec. 18, 1923, Finished Steel, 2.775c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets

These products constitute 88 per cent of the United States output of finished steel

Dec. 11, 1923,	2.775c.
Nov. 20, 1923,	2.775c.
Dec. 19, 1922,	2.439c.
10-year pre-war average,	1.689c.

Composite Price, Dec. 18, 1923, Pig Iron, $21.88 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham

Dec. 11, 1923,	$21.88
Nov. 20, 1923,	20.77
Dec. 19, 1922,	25.42
10-year pre-war average,	15.72

Sentiment grows more cheerful as the year draws to a close and there is a pretty general belief that after the completion of inventories business will be on a steadily expanding scale. There is a note of conservatism, however, about new year forecasts. Close observers point out that buyers have not abandoned a policy of careful purchasing and the development of anything approaching a runaway market it is believed would bring a sudden halt in demand. Evidently the trade as a whole is shaping its plans for good business, but at steady prices over the fore part of the new year.

Increased strength is observed in the scrap market and the reason is not found alone in Steel Corporation purchases. Independent companies have paid $19 for heavy melting steel and are freely bidding that price for more tonnage. The spread between scrap and pig iron has grown so slim that there is now some talk of higher prices for the latter. Such business as has been done in the steel making grades of pig iron, however, suggests that prices are not especially rigid. A considerable tonnage of furnace coke for first quarter delivery has been closed, in most cases, at $4.40 per net ton at oven. The coal market still suffers from the fact that supplies are ample for all requirements. Talk is heard of a possible suspension in the union districts next April on the ground that the union leaders will make demands which the operators cannot grant. There are just as many, however, who believe that the present agreement will be renewed and all difficulties avoided.

There has been no special change in steel works activities in this district, but if there is a definite

tendency it is toward a higher rate. The Youngstown district as a whole is somewhat more fully engaged and late this week one merchant blast furnace, that of the A. M. Byers Co., Gerard, Ohio, and a steel works furnace, "D" furnace of the Youngstown Sheet & Tube Co., Youngstown, will go into blast.

Pig Iron.—It has been a quiet week and there is no occasion to change prices. A West Virginia sheet maker has closed for about 6000 tons of basic iron, the business being about equally divided between Wheeling and Youngstown steel makers. It is believed that the Youngstown iron sold at somewhat below $21, furnace. The market on that grade may be described as just steady at $21, although there have been quotations of $22 and of $22.60, the latter on an inquiry for 7500 tons for February and March delivery. The market is not very firm on Bessemer iron, for while such sales as have been reported, including one of 250 tons to Cleveland, have been at $23, Valley furnace, there is still one merchant furnace interest which would not turn down an attractive tonnage at $22.50. A fair amount of foundry iron, generally in small lots, has been sold at $22, Valley furnace, for the base grade. Some producers are quoting $22.50 and $23 for No. 2 foundry, but no sales of consequence have been made at those figures.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.76 per gross ton:

Basic	$21.00
Bessemer	23.00
Gray forge	$21.50 to 22.00
No. 2 foundry	22.00 to 22.50
No. 3 foundry	21.50 to 22.00
Malleable	20.00 to 22.50
Low phosphorus, copper free	29.00 to 30.00

Ferroalloys.—Drive for 1924 business in ferrosilicon of the higher content grades still is on and there has been a good response at $75 delivered East of the Mississippi River on 50 per cent and at least one good sized contract for 75 per cent material has been closed at $130. Ferrochromium contracts for 1924 are being taken at 11c. per lb. contained chromium for 4 to 6 per cent carbon material, and at 10c. for higher carbon alloy. In seeking new business, leading makers of spiegeleisen have gone as low as $38 furnace for 19 to 21 per cent material, a cut of $2 a ton from the recent level. A price of $109 seaboard for domestic ferromanganese has been established by fairly large sales. British material is not moving with much freedom, but is firmly held at $110 seaboard, and in view of a firmer manganese ore market, it is probable that this price will be maintained. Prices are given on page 1693.

Semi-Finished Steel.—Activity is lacking and so are new features. Business in finished products has not yet assumed such proportions with the nonintegrated that they have pressing needs of steel; indeed, most of them appear amply fortified against such business as is coming out. Negotiations for first quarter tonnages of sheet bars and billets and slabs are in progress, but they are not closing very rapidly in view of the general idea that advances from current levels are unlikely. At the same time sheet bars, for which there is a much heavier demand than for the other forms, are very firmly held at $42.50 Pittsburgh or Youngstown. Improved demand for steel from the automotive industry is expected to bring about more demand for forging billets. Activity is still absent in skelp and the rod market is quiet, although large users are said to be sending in their estimates of probable first quarter tonnage and some suspended business lately has been released. Rods are steady at $51, base, but the market is untested on skelp. Prices are given on page 1693.

Wire Products.—Jobbers are showing more interest in supplies for shipment after Jan. 1, and some of them are placing contracts, but as a general rule, the inventory period is keeping most of them out of the market and real activity from this source is not looked for until after the middle of next month. Manufacturing consumers are covering against first quarter requirements, but specifications do not run heavy beyond January shipments. Current nail orders are good and some manufacturers are finding it difficult to supply the demand and at the same time build up stocks against the spring requirements. Local mills disclaim encountering lower prices than they are quoting on nails and claim that observance of quotations is general on all of the leading products. Prices are given on page 1692.

Steel Rails.—Inquiry is reported to be somewhat better in light rails, but it is still admitted that sales are few and small and that they are likely to continue so until there is some betterment in the coal industry. Billet rails still are held at 2.25c. base, but that price is too far above that for rerolled sections for buyers to overlook the difference.

We quote light rails rolled from billets at 2.25c. base (25-lb. to 45-lb.); rerolled rails, 1.85c. to 2c. base (12-lb. to 45-lb.), f.o.b. mill; standard rails, $43 per gross ton mill, for Bessemer and open-hearth sections.

Iron and Steel Bars.—While no big orders for merchant steel bars are coming out, makers are encouraged to look for more activity by the fact that the regular price of 2.40c., base, is being obtained somewhat more easily than was true a week ago. Lack of new railroad business keeps down demand for iron bars, but recent prices are well maintained.

We quote soft steel bars, rolled from billets, at 2.40c. base; bars for cold-finishing of screw stock analysis, $3 per ton over base; reinforcing bars, rolled from billets, 2.40c. base; refined iron bars, 3.25c. base, in carload lots or more, f.o.b. Pittsburgh.

Tubular Goods.—The interesting development of the week is an advance in the price of Pennsylvania crude oil. This grade, which declined, starting last spring, from $4.25 per barrel to $2.40, has been advanced 25c. a barrel in the past week. With advances also noted in other producing sections and advices telling of a further decline in California production, the idea of an increased demand for oil country pipe after the turn of the new year gains adherents. Current demand for oil country pipe is light, although the South Penn Oil Co. recently put out an inquiry for 1500 tons of casing and tubing. Standard pipe orders and specifications still are flowing in freely. Outside of the suspension of a lapweld furnace by the Republic Iron & Steel Co., Youngstown, there has been no material change in the operating schedules of local and nearby mills. Boiler tubes still are dull and makers are not especially hopeful about the immediate future. There is some divergence of opinion as to whether the railroads will be buyers of locomotives in the near future. Much business in mechanical tubing lately has come from the automobile makers, one order taken by a local maker being for 2500 tons a month for the first quarter of 1924. There is some irregularity in boiler tube prices, but those for pipe are well maintained. Discounts are given on page 1692.

Sheets.—The market still is improving both in sentiment and in an actual way. Automobile builders, though still showing some disinclination to buy ahead at current prices, are heavier buyers than they have been and the fact that the bulk of the business is for early shipment confirms impressions that this industry was going along with pretty light stocks. There is much talk of increased production of automobiles in 1924, but a gain over this year's production will surprise close observers here, who expect that gains which may be made by some will be offset by others losing ground next year. In the commoner finishes, ordering shows a satisfactory increase over that for November and while December hardly will be comparable with this month last year, when independent manufacturers booked about 400,000 tons, it is expected to show up well by comparison with other years. There is no occasion to change the range of prices on black, galvanized or blue annealed sheets, but mills taking business at the lower prices are growing fewer daily and not much first quarter business is being accepted at these figures. The American Sheet & Tin Plate Co. is running about 80 per cent of its sheet mills and the independents about 68 per cent, making an average for the entire industry of about 70 per cent, or practically the same as a week ago. Prices are given on page 1692.

Tin Plate.—The tin plate market is pretty much a closed book as far as production plate for the first half of next year is concerned. The leading interest is booked solidly for that period and the leading inde-

pendent companies are in pretty much the same position. There should be no shortage of containers for the 1924 pack of perishable foods, since early naming of tin plate requirements means that makers of the latter will be able to produce much tonnage before hot weather cuts into mill activities. The price of all makers is $5.50 per base box Pittsburgh for standard cokes.

Cold-Finished Steel Bars and Shafting. — Local makers still are quoting 3c. base Pittsburgh, but are equalizing the freight to competitive territory, with the Chicago mill naming the same price f.o.b. Chicago. There has been no abandonment of the Pittsburgh base by mills in this district; they are meeting the condition created by the action of the Chicago mill until such time as the Chicago unit gets filled up. Except to Indianapolis, to which Chicago mills have a low commodity rate, as distinct from a class rate to other consuming points, it is said the difference in freight rates between Chicago and Pittsburgh is slight. Most Eastern mills, however, are barred from Chicago unless a freight of $6.80 a ton is to be absorbed. Business shows some improvement, but there is room for more. Ground shafting is unchanged at 3.40c. base, f.o.b. mill, for carload lots or more.

Hot-Rolled Flats.—While deviations from the regular base of 3c. have not entirely disappeared, they are not so frequent as they were recently and there really is good observance of that price on hoops and bands. A good many contracts for strips have been made at 3c. for first quarter shipment, but these are chiefly from the small tonnage consumers. Prices are given on page 1692.

Cold-Rolled Strips.—Leading producers are now firm at 5c. base Pittsburgh for first quarter tonnages and a number of contracts for that period are being entered at that price. Lower prices are disappearing, as those naming them have become pretty well filled up.

Structural Material.—The general situation shows little change other than that producers think they detect some abandonment of the idea of lower prices on the part of consumers. This tends to strengthen the position of the mills on the question of prices. An addition to the William Penn Hotel, Pittsburgh, is again being mentioned, and a new building for the Monongahela National Bank has been listed among new local building projects. Plain material prices are given on page 1692.

Plates.—Consuming industries, such as tank and car builders, are running out of orders, and this condition is reflected in very sparing demands for plates. On passing business, however, mills here report that it has been easier to get the quoted price than it was recently. Prices are given on page 1692.

Bolts, Nuts and Rivets.—Most makers appear to have lined up a satisfactory volume of first quarter contract business and are very firm at the revised prices recently established. Specifications against contracts are fairly free, but there is very little business calling for delivery over the remainder of the year. Prices and discounts are given on page 1692.

Track Supplies.—Actual orders still are moderate, but manufacturers do not believe that the railroads have covered their early 1924 requirements, and are looking forward to more active business after the turn of the year. Prices of spikes show some variation, but on large orders the market seems to be down pretty well to $3, base, per 100 lb., for large spikes. Prices are given on page 1692.

Coke and Coal.—It is now estimated that about 150,000 tons of furnace coke per month has been placed on the producers' books for delivery the first quarter of next year. There was one contract for an Eastern furnace for about 15,000 tons a month at $4.50 per net ton at oven, but generally $4.40 has been the top price paid and a considerable tonnage was entered at $4.25, and even as low as $4. The contract market appears to be quotable anywhere from $4 to $4.50. The spot furnace coke market holds right around $4, although there have been some instances where as low as $3.75 has been named to move loaded cars. Spot foundry coke still ranges from $4.75 to $5.50, while the contract spread is from $5.50 to $6.50. Coal prices hold at the week's levels, but supplies are plentiful and the market easy. We quote mine run steam coal from $1.50 to $1.75 for Connellsville district coal, $1.90 to $2.40 for Panhandle grade, $1.85 to $2 for coking coal, $2.25 for gas coal. Steam slack coal holds at $1.50 to $1.60 and gas slack at $1.75, these prices all being per net ton, f.o.b. mines.

Old Material.—The market has gained additional strength in the steel works grades since a week ago, and while sales of heavy melting steel have been made as low as $18.50, there have been sales also of this grade at $19 to independent mills, and today that price is being freely bid. It is doubtful whether any considerable tonnage today could be bought for less than that price. Indeed there is a report that the Carnegie Steel Co. closed today for 10,000 tons and paid $19.50, and also that the Steel Corporation bought a round tonnage of this grade for Chicago at $18.50. The market has gained strength on compressed sheets, which recently were inclined to lag. A Shenango Valley steel maker is reported to have paid $17 for the latter grade and that price also was paid by a Pittsburgh district independent, while a West Virginia sheet maker paid $17.50 for a tonnage of this material. This makes the quotable range on this grade from $17 to $17.50 and we continue the range $18.50 to $19 on heavy melting grade, based on actual sales in the past week. A steel maker in this district who was a buyer of heavy melting steel at $16 to $16.50 is not getting free deliveries on those purchases, and is seeking additional tonnages to make up the deficiency. Foundry grades are slow, but the market still is active and strong on blast furnace material. Norfolk & Western Railway will take bids to noon, Dec. 19, on 13,583 gross tons of iron and steel scrap.

We quote for delivery to consumers' mill in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

	Per Gross Ton
Heavy melting steel	$18.50 to $19.00
No. 1 cast, cupola size	19.50 to 20.00
Rails for rolling, Newark and Cambridge, Ohio; Cumberland Md.; Huntington, W. Va., and Franklin, Pa.	18.50 to 19.00
Compressed sheet steel	17.00 to 17.50
Bundled sheets, sides and ends	15.00 to 15.50
Railroad knuckles and couplers	20.00 to 20.50
Railroad coil and leaf springs	20.00 to 20.50
Low phosphorus blooms and billet ends	21.50 to 22.00
Low phosphorus plate and other material	20.00 to 20.50
Railroad malleable	17.50 to 18.00
Steel car axles	19.00 to 19.50
Cast iron wheels	18.50 to 19.00
Rolled steel wheels	20.00 to 20.50
Machine shop turnings	14.00 to 14.50
Sheet bar crops	19.00 to 19.50
Heavy steel axle turnings	16.00 to 16.50
Short shoveling turnings	15.00 to 15.50
Heavy breakable cast	17.50 to 18.00
Stove plate	14.00 to 14.50
Cast iron borings	15.00 to 15.50
No. 1 railroad wrought	13.50 to 14.00
No. 2 railroad wrought	18.50 to 19.00

Two-Flow Ring-Circuit Water Tube Boiler

Amounting to a treatise on the subject of evaporation, this book of 268 pages, issued by the Kidwell Boiler Co., Milwaukee, contains a lucid explanation of the principles underlying correct boiler design and operation, and their application to boiler analysis. The book is profusely illustrated, several of the cuts having three colors to show the arrangement of types of boiler settings.

Everything pertaining to boilers and their operation appears to have been covered. Modern fuels are given particular attention, oil and gas being treated from the point of view of the necessary furnace volume for their proper combustion and the disposition of the products of combustion. In summing up the particular advantages of the Kidwell boiler, attention is drawn to its rapid natural water circulation, its capacity for heavy overload, its suitability for superheating, its great furnace volume and a number of other matters covered in considerable detail.

Chicago

Santa Fé Buys Rails—Important Car Buying Expected Soon

CHICAGO, Dec. 18.—The feature of the week's steel market was the purchase of 102,500 tons of rails and 25,000 tons of track supplies by the Santa Fe. The distribution of the fastenings was in proportion to the rails, the apportionment of which is published under the paragraph on rails and track supplies. Railroad car buying is also commanding attention as a prospective source of tonnage for the mills. The Southern Pacific is expected to close tomorrow for 10,000 cars, while the St. Louis Southwestern has divided an order for 1000 box cars between the American Car & Foundry Co. and the Mount Vernon Car Mfg. Co., and the Chicago & Alton has placed 250 box cars with the Pullman Co. The Chesapeake & Ohio, on the other hand, has decided not to buy the 2000 gondola cars on which it recently took figures.

Outside of buying by the railroads, the market is devoid of important developments. Mill bookings still fall short of shipments, but the business outlook has improved. Liberal inquiries for bars from the automotive interests and the jobbers are pending and construction prospects are favorable. In Chicago a number of large fabricating projects will come up for figures early in the New Year. Among them the Chicago Tribune Tower and the New Palmer House, each involving 11,000 tons, are prominent. Sheets and bolts and nuts, commodities which have been weak for a considerable period, are showing signs of strength. Plates, shapes and bars and wire products remain firm at unchanged prices. Consumers' stocks generally are exceedingly low and replenishment buying will soon become imperative.

Local mill operations are unchanged. The Illinois Steel Co. still has 19 active stacks out of 27 steel works blast furnaces, and is producing steel at the rate of 75 per cent of ingot capacity.

Ferroalloys.—A number of sales of spiegeleisen, aggregating 1500 tons, have been made for first quarter and first half deliveries at $37 furnace or $45.58 delivered. It is said that this quotation has now been withdrawn and that the best available price today is $2 higher. Practically all users of 50 per cent ferrosilicon have closed for their 1924 requirements at $75 delivered. Two carloads of 10 to 12 per cent Bessemer ferrosilicon for Michigan delivery brought out a price of $38, Niagara Falls. A local melter closed for 450 tons of 14 to 16 per cent ferrosilicon at approximately $47.50 delivered. In the absence of sales, ferromanganese remains nominally at $110 seaboard.

We quote 80 per cent ferromanganese, $117.56, delivered; 50 per cent ferrosilicon, $75, delivered; spiegeleisen, 18 to 22 per cent, $45.58 to $47.58, delivered.

Pig Iron.—The market is quiet as the holidays draw near, and outside of a fair volume of spot buying there is little activity to report. Among the few forward purchases was 500 tons of foundry for first quarter delivery, bought by a local melter. Small orders for prompt shipment have been fairly numerous, indicating that foundries, in their efforts to keep inventories down to the minimum, underestimated their December needs. One of the most favorable developments is the fact that melters are finally closing first quarter contracts for castings in good volume. Now that their forward needs are more clearly defined, they will no doubt find it necessary to come into the market for additional iron. Notwithstanding the large tonnage placed for first quarter in November, it is evident that there is still considerable iron to be bought for that delivery. The price situation appears to be weaker, although owing to the paucity of transactions, it has not undergone real test. In competitive territories such as the St. Louis district and Michigan, sales have been made at 50c. to 75c. under the market. In the Chicago district proper, malleable alone is unsteady, and in a few instances has been shaded to the extent of 50c. a ton. Although it is intimated that an attractive tonnage might be placed for first quarter at $23 base, Chicago furnace, a number of melters have failed to place their requirements at less than the regular price of $23.50, or 50c. over the price for prompt material. Southern foundry remains unchanged at $21, Birmingham, but sales in this territory have been confined to a few carload lots. Charcoal, low phosphorus and silvery are quiet.

Quotations on Northern foundry high phosphorus malleable and basic irons are f.o.b. local furnace and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumer's yard or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal averaging sil. 1.50, delivered at Chicago..	$29.15
Northern coke, No. 1, sil. 2.25 to 2.75	$23.50 to 24.00
Northern coke, foundry, No. 2, sil. 1.75 to 2.25	23.00 to 23.50
Malleable, not over 2.25 sil.	23.00 to 23.50
Basic	23.00 to 23.50
High phosphorus	23.00 to 23.50
Southern No. 2	27.01
Low phos., sil. 1 to 2 per cent, copper free	34.79
Silvery, sil. 8 per cent	37.29

Plates.—Mills have quoted on the steel involved in cars recently placed and expect considerable additional tonnage to come up for consideration with the award of cars still pending. The Southern Pacific will probably close against its inquiry for 10,000 cars during the current week. Oil storage tank buying is at a low ebb. A Los Angeles contractor, however, is in the market for 2450 tons of plates for tanks to be erected in California.

The mill quotation is 2.60c., Chicago. Jobbers quote 3.30c. for plates out of stock.

Bars.—A considerable tonnage of soft steel bars, representing first quarter requirements of both jobbers and automotive interests, is pending, with the likelihood that orders will be placed soon. While prospects are regarded as favorable, actual buying to date has been light. Local prices remain unchanged at 2.50c. Chicago. Demand for bar iron shows no improvement. Business in hard steel bars is still unsatisfactory, although heavier orders are expected early in 1924, with a seasonal revival in fence post manufacture. Those bar iron and rail steel bar mills which are not operating intermittently find it difficult to sustain continuous production on a single turn basis.

Mill prices are: Mild steel bars, 2.50c., Chicago; common bar iron, 2.40c., Chicago; rail steel, 2.30c., Chicago mill.

Jobbers quote 3.20c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 4c. for rounds and 4.50c. for flats, squares and hexagons.

Jobbers quote hard and medium deformed steel bars at 3c. base; hoops, 4.45c.; bands, 3.95c.

Structural Material.—Fabricating awards are more numerous and prospective tonnage scheduled to come up for bids early in the new year bulks large. The New Palmer House and the Chicago Tribune Tower, Chicago, will each require 11,000 tons. A new foundry building for the Crane Co. at Chicago will involve 7000 tons. Revised plans are being prepared for the Union League Club Building, Chicago, 5000 tons, on which preliminary figures were recently taken.

The mill quotation on plain material is 2.60c., Chicago. Jobbers quote 3.30c. for plain material out of warehouse.

Rails and Track Supplies.—The Santa Fe has distributed rail orders as follows: 70,000 tons to Colorado Fuel & Iron Co., 17,850 tons to the Illinois Steel Co., 10,350 tons to Inland Steel Co., 4300 tons to the Bethlehem Steel Co. Out of 75,000 kegs of spikes placed by the New York Central, 20,000 kegs were ordered from the Illinois Steel Co. and the remainder was apportioned among the Inland Steel Co. and mills east of here. That road has not yet placed the other track supplies on which it recently took figures. Local rail mills are comfortably booked through the first half of next year, although some Western lines have not yet closed for their requirements. Among them are the

Northwestern, the Omaha, the Soo Line and Northern Pacific. It is also thought likely that the Burlington, the Great Northern and the Illinois Central may come into the market for additional tonnage.

Standard Bessemer and open-hearth rails, $43; light rails, rolled steel, 2.25c., f.o.b. makers' mills.

Standard railroad spikes, 3.10c. mill; track bolts with square nuts, 4.10c. mill; iron tie plates, 2.55c. to 2.60c. mill; steel tie plates, 2.60c., f.o.b. mill; angle bars, 2.75c., f.o.b. mill.

Jobbers quote standard spikes out of warehouse at 3.75c. base, and track bolts, 4.75c. base.

Bolts and Nuts.—Discounts are firm and specifications are somewhat heavier. Automobile manufacturers are expanding their operations and are expected to be heavy buyers in the coming quarter, but purchases by farm implement makers average not more than 30 per cent of normal. Business, on the whole, is increasingly satisfactory, and one Western bolt and nut plant is operating full. Discounts are those on page 1692, but for this territory they are on an f.o.b. Chicago basis.

Jobbers quote structural rivets, 3.75c.; boiler rivets, 3.95c.; machine bolts up to ⅞ x 4 in., 55 and 5 per cent off; larger sizes, 55 and 5 off; carriage bolts up to ⅞ x 6 in., 50 and 5 off; larger sizes, 50 and 5 off; hot pressed nuts, squares and hexagons, tapped, $3.50 off; blank nuts, $3.50 off; coach or lag screws, gimlet points, square heads, 60 and 5 per cent off.

Wire Products.—Bookings of the mills are slightly heavier and while little contracting has been done, prospects for the first 60 days of next year are regarded as favorable. It is pointed out that stocks of both jobbers and retailers are low, and manufacturing users likewise have light inventories. Leading mills are still operating at about 80 per cent of capacity. For mill prices, which are unchanged, see page 1692.

We quote warehouse prices f.o.b. Chicago: No. 6 to No. 9 bright basic wire, $3.90 per 100 lb.; extra for black annealed wire, 15c. per 100 lb.; common wire nails, $3.80 per 100 lb.; cement coated nails, $3.25 per keg.

Cast Iron.—Denver takes bids Dec. 19 on 1485 tons of 20- and 24-in. and 6500 tons of 36-, 42- and 48-in. water pipe. Spring Wells, Mich., receives tenders Dec. 26 on 600 tons of 6-in. class B water pipe. The Omaha Gas Co. is in the market for several hundred tons of gas pipe. The Council Bluffs Gas Co. has placed 500 tons of gas pipe with the National Cast Iron Pipe Co. Prices are steadily growing firmer and early advances are looked for. Growing scarcity of the smaller diameters possibly forecasts premiums on those sizes.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., $59.20; 6-in. and above, $55.20; class A and gas pipe, $5 extra.

Sheets.—The market situation shows little change. A number of independent mills are still booking galvanized and black at concessions of $2 a ton under the Steel Corporation prices, but the amount of business going at the latter figures is increasing.

Mill quotations are 3.75c. to 3.85c. for No. 28 black, 3c. for No. 10 blue annealed and 4.90c. to 5c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 34c. per 100 lb.

Jobbers quote, f.o.b. Chicago, 4c. for blue annealed, 4.70c. for black and 5.85c. for galvanized.

Reinforcing Bars.—Lettings are few and new projects are largely of a prospective nature on which action is not expected until some time after the first of the year. Although a dull market was looked for with the approach of the holiday season, it is to be noted that even small tonnages are bringing out rather sharp concessions in prices and the quotation of 3c., Chicago warehouse, is rapidly becoming a purely nominal figure. The weakness of the situation is illustrated by the fact that a job of less than 75 tons, in miscellaneous lengths, was taken directly by a producer at the mill price of 2.50c., Chicago.

Lettings include:

State road work near Galesburg and Monmouth, Ill., 150 tons, A. M. Castle & Co.

Plant for Capitol Brass Works, Detroit, Mich., 100 tons to McRae Steel Co.

Pending business includes:

Continental Can Co., plant at Chicago, 600 tons, Francisco & Jacobus, architects.

Municipal work for St. Paul, Minn., 412 tons.

Indiana State road work, 300 tons, bids on general contract to be received Dec. 18.

Illinois State road work, 300 tons, general contracts placed, but steel not yet bought.

Old Material.—No further consumer purchases of heavy melting have been made, but dealers find it necessary to pay advancing prices to fill their short orders. The possibility that the Steel Corporation, which recently bought liberally at Pittsburgh, may also enter the market here is causing holders of scrap to conserve their stocks in anticipation of still higher prices. This has given the market an appearance of scarcity, although actually available supplies are probably materially in excess of current demand. Consumer buying, while confined to small lots, covers most grades outside of heavy melting, and is more than sufficient to absorb all scrap on track. Railroad offerings include the Chesapeake & Ohio, 12,000 tons; the Rock Island, 6000 tons; the Chicago & Alton, 1500 tons, and the Soo Line, 600 tons.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Iron rails	$20.00 to $20.50
Cast iron car wheels	20.00 to 20.50
Relaying rails, 56 and 60 lb.	26.00 to 27.00
Relaying rails, 65 lb. and heavier	32.00 to 35.00
Forged steel car wheels	20.00 to 20.50
Railroad tires, charging box size	20.00 to 20.50
Railroad leaf springs, cut apart	20.50 to 21.00
Rails for rerolling	17.50 to 18.00
Steel rails, less than 3 ft.	19.50 to 20.00
Heavy melting steel	16.50 to 17.00
Frogs, switches and guards cut apart	16.50 to 17.00
Shoveling steel	16.00 to 16.50
Drop forge flashings	12.00 to 12.50
Hydraulic compressed sheets	13.50 to 14.00
Axle turnings	13.50 to 14.00
Steel angle bars	18.50 to 19.00

Per Net Ton

Iron angle and splice bars	21.00 to 21.50
Iron arch bars and transoms	21.00 to 21.50
Iron car axles	26.00 to 26.50
Steel car axles	17.50 to 18.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	8.00 to 8.50
Cut forge	15.00 to 15.50
Pipes and flues	10.50 to 11.00
No. 1 railroad wrought	15.50 to 16.00
No. 2 railroad wrought	15.00 to 15.50
Steel knuckles and couplers	18.50 to 19.00
Coil springs	20.00 to 20.50
No. 1 machinery cast	20.00 to 20.50
No. 1 railroad cast	19.00 to 19.50
No. 1 agricultural cast	19.00 to 19.50
Low phos. punchings	16.00 to 16.50
Locomotive tires, smooth	17.50 to 18.00
Machine shop turnings	9.00 to 9.50
Cast borings	11.25 to 11.75
Short shoveling turnings	11.25 to 11.75
Stove plates	18.00 to 18.50
Grate bars	16.50 to 17.00
Brake shoes	17.50 to 18.00
Railroad malleable	18.00 to 18.50
Agricultural malleable	18.00 to 18.50

Detroit Scrap Market

DETROIT, Dec. 18.—With the first week of the inventory period under way, most melters have asked for shipments to be deferred until after the first of the year. This applies to waste material as well as pig iron. Where these materials are contracted for, tentative production schedules for the first quarter of the year have been set by most of the automobile manufacturing companies, but definite tonnages have not been allotted the casting producers. This is especially true in the malleable industry. Prices, the same as quoted a week ago, follow.

The following prices are quoted on a gross ton basis f.o.b. cars producers' yards, excepting stove plate, No. 1 machinery cast and automobile cast, which are quoted on a net ton basis:

Heavy melting steel	$14.50 to $15.00
Shoveling steel	13.50 to 14.50
Borings	10.00 to 11.00
Short turnings	10.00 to 11.00
Long turnings	9.50 to 10.00
No. 1 machinery cast	17.00 to 18.00
Automobile cast	23.50 to 24.00
Hydraulic compressed	11.50 to 12.00
Stove plate	15.00 to 16.00
No. 1 busheling	10.00 to 11.00
Sheet clippings	8.75 to 9.25
Flashings	10.50 to 11.00

New York

Demand for Structural Steel Continues with Uncertainty in Other Lines

NEW YORK, Dec. 18.—Varying factors in the finished steel market leave the situation somewhat muddled as the year draws to a close. On the one hand, is a very large demand for structural steel, which has resulted in a decided stiffening in fabricated steel prices. Some of the local fabricating shops are filled for four to seven months and are less inclined to quote low prices in view of that fact. Last week's awards, as reported by local steel offices and fabricators, total close to 25,000 tons, and there is a good deal of work pending. In no other branch of the steel trade, however, is the situation so promising. Manufacturing consumers are in no hurry to cover for first quarter except possibly in tin plate, which is now pretty well sold for first quarter. Steel companies are resisting the efforts of customers to contract at lower than today's quotations. This has been particularly true in bars. Railroads are making no move to anticipate their 1924 car requirements, as it was confidently expected they would do before the end of the year. In fact, the Chesapeake & Ohio Railroad has definitely withdrawn its inquiry for 2000 cars, giving as a reason the high prices quoted on the specialties. Car builders, however, are anxious for business and willing to make concessions that may offset other high costs. Where material is needed for maintenance, the railroads are not backward, however, in placing orders. For example, the New York Central last week divided orders for 60,000 or more kegs of track spikes and a proportionately large tonnage of track bolts for 1924 shipment, four mills having taken the business. The demand for plates is only slightly improved, if any, and operations of Eastern plate mills over the remainder of the month will be low.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, 2.74c.; plates and structural shapes, 2.74c. to 2.84c.; bar iron, 2.74c.

Pig Iron.—The only inquiry of any importance pending is that of the Worthington Pump & Machinery Corporation for about 2000 tons, of which 1450 is for delivery to Harrison, N. J., and the remainder to East Cambridge, Mass. Sales of small tonnages have been fairly numerous, and one company reports an aggregate of 1000 tons sold in Connecticut. Some of the selling has been for prompt shipment, but most of it for first quarter. Reports from salesmen who have been in New England the past week indicate that foundries connected with hardware companies are very busy, but those connected with machine tool concerns are working at a reduced rate. Prices show little, if any, change, with $22, Buffalo, as the usual price made by furnaces in that district, and $23 as the usual price in eastern Pennsylvania. Some Buffalo iron in the hands of brokers is being sold at $22 for No. 2X and $22.50 for No. 1X. Many foundries will close for the holidays, some for a week and some for two weeks.

We quote delivered in the New York district as follows, having added to furnace price $2.27 freight from eastern Pennsylvania, $4.91 from Buffalo and $5.44 from Virginia:

East. Pa. No. 1X fdy., sil. 2.75 to 3.25	$25.27 to $25.77
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	24.77 to 25.27
East. Pa. No. 2, sil. 1.75 to 2.25	24.77 to 25.27
Buffalo, sil. 1.75 to 2.25	26.41 to 26.91
No. 2X Virginia, sil. 2.25 to 2.75	29.94 to 30.44
No. 2 Virginia, sil. 1.75 to 2.25	29.44 to 29.94

Ferroalloys.—There are several inquiries for ferromanganese before the market, including one for 1000 tons, another for 500 and the total aggregating over 2000 tons. One British representative reports the sale of at least 1000 tons the last week at the British price of $110, seaboard. Domestic producers are taking some business at a concession of at least $1 under this price. The spiegeleisen market is moderately active at unchanged quotations. Contracts for 1924 in 50 per cent ferrosilicon are reported as being satisfactorily negotiated at the new quotation announced last week of $75 per ton, delivered, for alloy containing 50 per cent ferrosilicon.

Cast-Iron Pipe.—As a result of the approaching holidays and the advanced season business is extremely light. A renewal of activity is expected early in January. In the meantime, makers are offering concessions to purchasers willing to accept winter delivery. One maker in this district reports a suspension of activity for inventory and repairs. We quote per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, $61.60 to $63.60; 4-in. and 5-in., $66.60 to $68.60; 3-in., $76.60 to $78.60, with $5 additional for Class A and gas pipe. Makers of soil pipe are, as a rule, booked well into February. Present business is light. Most makers will probably close down between Christmas and New Year for inventory and repairs. We quote discounts of both Southern and Northern makers, f.o.b. New York, in carload lots, as follows: 6-in., 29½ to 35¾ per cent off list; heavy, 39½ to 45¾ per cent off list.

Warehouse Business.—Business out of stock has declined to a very light demand for prompt delivery of small lots. Prices continue firm. The market on blue annealed sheets is fairly well established at 4.34c. per lb. base. Although sellers of black and galvanized sheets have made efforts to stiffen prices to a more profitable basis, the lower quotations continue in some cases. Galvanized sheets, however, are stronger than black, as stocks on hand are apparently not as large. Sales of wrought iron and steel pipe are small, this being the usual situation at this season. No increase in the volume of business is expected until after Jan. 1. We quote prices on page 1710.

Coke.—Prices continue firm and demand is fairly active, with some contracting for next year. Standard foundry coke is firm at 5.25 to $6.25 per ton and standard furnace at $4 to $4.50 per ton. By-product is quoted at $10.91, Newark and Jersey City, N. J.

Old Material.—Prices continue firm with a slight upward tendency on some grades. Heavy melting steel ranges from $16.50 to $17 per ton, eastern Pennsylvania, with occasional higher prices. Holders of steel show a strong inclination to await higher prices before selling. Specification pipe is firm at $16 for both Lebanon and Milton, Pa. Stove plate is fairly active, shipments going forward to Harrisburg and Phoenixville, Pa., and West Mahwah, N. J., at $16.50 per ton. Cast borings are generally quoted at $13.75 per ton delivered eastern Pennsylvania consumers, machine shop turnings at $14.50 per ton and borings and turnings at $12 or more. But little activity is expected until after Jan. 1, except for transactions between dealers.

Buying prices per gross ton New York follow:

Heavy melting steel, yard	$12.50 to $13.00
Steel rails, short lengths, or equivalent	13.25 to 13.75
Rails for rolling	15.00 to 16.00
Relaying rails, nominal	25.00 to 26.00
Steel car axles	16.00 to 17.00
Iron car axles	24.00 to 24.50
No. 1 railroad wrought	13.50 to 14.00
Forge fire	9.50 to 10.00
No. 1 yard wrought, long	12.00 to 12.50
Cast borings (clean)	10.00 to 10.50
Machine-shop turnings	10.50 to 11.00
Mixed borings and turnings	9.00 to 9.50
Iron and steel pipe (1 in. diam., not under 2 ft. long)	12.00 to 12.50
Stove plate	12.50 to 13.50
Locomotive grate bars	12.50 to 13.00
Malleable cast (railroad)	14.00 to 15.00
Cast-iron car wheels	15.00 to 15.50

Prices which dealers in New York and Brooklyn are quoting to local foundries per gross ton follow:

No. 1 machinery cast	$19.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	18.00
No. 1 heavy cast, not cupola size	14.50
No. 2 cast (radiators, cast boilers, etc.)	16.00

On Dec. 10 total steel ingot production, representing the combined output of the Bessemer and open-hearth departments of the Carnegie Steel Co., at Youngstown, exceeded the total production of these departments for any previous 12-month period. The company's Ohio Works, McDonald plant and Upper and Lower Union Works are operating at a capacity rate.

Cincinnati

Limited Sales of Pig Iron at Recent Prices—Scrap Advanced

CINCINNATI, Dec. 18.—With the exception of a sale of approximately 1500 tons of malleable to a central Ohio melter, the market activity last week was confined almost exclusively to one and two carload lots, charcoal and foundry iron sales predominating. Most of the iron sold was from the North, very little Southern iron coming out. The L. & N. Railroad bought 750 tons of Southern iron on a $21 Birmingham base. A car manufacturer took 500 tons of foundry, including about 200 tons of Virginia iron, at $24 furnace. Prices on all grades show little change from the previous week, the exception being in the case of the high silicon Southern irons, where a concession of 50c. per ton has been made. On the lower grades, however, the base price with regular differentials is being maintained. In southern Ohio $22.50 continues as the minimum, with one furnace now asking $24. Numbers of contracts are being made for ferrosilicon requirements and a sale of 200 tons of spiegeleisen has been made for first quarter delivery.

Based on freight rates of $4.05 from Birmingham and $2.27 from Ironton we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	$25.05
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	25.55
Ohio silvery, 8 per cent	34.77
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	24.77
Basic Northern	24.77
Malleable	24.77

Fluorspar.—A sale of 300 tons of fluorspar was made last week at the schedule. Some of the smaller mines have ceased operations for the winter months, and the larger producers will now be a factor in the market. Prices generally are strong, at $22 to $23.50, Illinois and Kentucky mines.

Sheets and Tin Plate.—Current business is light, but orders for shipment after Jan. 1 are coming through in good shape. A number of the larger consumers have asked that shipments be held up for a few days near the end of the year, so that inventories might be low. The price situation has strengthened to the extent that fewer mills are quoting low prices, but it is still possible to buy black and galvanized sheets for December shipment at from $2 to $4 below the regular price. Tin plate continues in good demand, with prices strong.

Structural Materials.—Third National Bank Building, Dayton, Ohio, involving 1050 tons, has been awarded to the American Bridge Co. This is the only award of importance. Steel for the Kentucky Hotel, Louisville, involving approximately 2200 tons, is on inquiry, though not the full tonnage as yet. The Coal Exchange Building, Huntington, W. Va., will probably be awarded shortly. This building will require about 800 tons, and bids were taken some time ago. No. 1 Office Building, State of West Virginia, to be built at Charleston, will require 1000 tons, on which bids will close Dec. 21.

Warehouse Business.—Local warehouses report that this month to date is showing more activity than was presented in the same period in November. Orders, while very numerous, are for small tonnages. No price changes have been made, but it is probable that a reduction in prices of cold-rolled steel will be made to meet the reduction of $6 per ton put into effect by Chicago jobbers.

Cincinnati jobbers quote: Iron and steel bars, 3.50c.; reinforcing bars, 3.60c.; hoops, 4.55c.; bands, 4.25c.; shapes, 3.60c.; plates, 3.60c.; cold-rolled rounds, 4.25c.; cold-rolled flats, squares and hexagons, 4.75c.; No. 10 blue annealed sheets, 4.10c.; No. 28 black sheets, 4.80c.; No. 28 galvanized sheets, 5.85c.; No. 9 annealed wire, $3.60 per 100 lb.; common wire nails, $3.50 per keg base; cement coated nails, $3.30 per keg.

Reinforcing Bars.—The municipal stadium at Terre Haute, Ind., contract for which will be let shortly, will require about 450 tons of bars, and these are expected to be awarded this week. The Kentucky Hotel, Louisville, Ky., will require about 120 tons. A number of other smaller projects are up for bids, and several small awards have been made, making a fair aggregate tonnage in all. Prices are holding at 2.20c. to 2.40c., mill, for rerolled and new steel bars respectively.

Finished Materials.—Demand for finished materials is light, one and two carload orders for prompt shipment predominating. While there has been a little contracting for first quarter materials, consumers generally have adopted a waiting policy, feeling that with the need for orders on the part of the mills they will not lose anything by waiting a few weeks before placing their business. For quick delivery 2.40c. is being done freely by a number of the smaller plate mills, but none of the larger companies has met this price. Shapes are holding fairly well at 2.50c. Some concessions on bars have been made on attractive orders, but this practice is by no means general. Action of the Chicago mill in quoting 3c., Chicagobase, on cold-rolled has been met by Pittsburgh district mills equalizing freight rates to points of shipment, which means in Cincinnati the equivalent of about 2.95c., Pittsburgh, with the regular freight added. There have been some sales of bolts and nuts, spikes, and other track material. Wire products are moving slowly.

Coke.—The coke market is exceptionally quiet, but prices are being held fairly well. Some Connellsville foundry coke for prompt shipment was offered today at $4.50 ovens, but the general asking price is $5. We quote:

Connellsville furnace, $4.00; foundry, $4.50 to $5.00; New River foundry, $10.00 to $11.00; Wise County furnace, $4.75 to $5.25; foundry, $5.75 to $7.00; by-product foundry, $8.00, Connellsville basis.

Old Material.—The local market is dull as far as sales are concerned, but dealers are still actively buying, and as a result the whole list is up at least 50c. Buying is expected to develop shortly on both steel and foundry grades, as some consumers are showing more interest in prices than for some time.

We quote dealers' buying prices, f.o.b. cars Cincinnati:

Per Gross Ton	
Bundled sheets	$11.00 to $11.50
Iron rails	14.50 to 15.00
Relaying rails, 50 lb. and up	28.50 to 29.00
Rails for rolling	14.50 to 15.00
Heavy melting steel	14.00 to 14.50
Steel rails for melting	14.00 to 14.50
Car wheels	14.00 to 14.50
Per Net Ton	
No. 1 railroad wrought	12.50 to 13.00
Cast borings	10.00 to 10.50
Steel turnings	9.50 to 10.00
Railroad cast	15.00 to 15.50
No. 1 machinery cast	18.00 to 18.50
Burnt scrap	12.00 to 12.50
Iron axles	22.50
Locomotive tires (smooth inside)	14.00 to 14.50
Pipes and flues	9.00 to 9.50

Canadian Scrap Market

TORONTO, ONT., Dec. 17.—While the Canadian iron and steel scrap market has been dull during the past week or ten days, selling interests are inclined to be more optimistic than in the past. It is stated that melters in general are short of scrap, and while these have been withholding contracts for first quarter requirements for some time, local dealers look for a general improvement in demand shortly after the turn of the year. The approaching holiday season and the fact that consumers are in the midst of inventories are features that are holding up business for the present, but despite this a certain amount of buying is reported on spot account. Steel plants and foundries are taking in small tonnage lots from time to time, but orders so far received specify delivery before the end of this year, and no contracts have been placed for first quarter. Prices are as follows:

Dealers' Buying Prices—Gross Tons

	Toronto	Montreal
Steel turnings	$10.00	$7.00
Machine shop turnings	10.00	7.00
Wrought pipe	8.00	8.00
Rails	12.00	13.50
No. 1 wrought scrap	14.00	14.00
Heavy melting steel	12.00	10.00
Steel axles	15.00	18.00
Axles, wrought iron	18.00	20.00
Net Tons		
Standard car wheels	15.00	14.00
Malleable scrap	15.00	12.00
Stove plate	15.00	14.00
No. 1 machinery cast	18.00	18.00

Boston

Pig Iron Business Dull—Some Resale Iron at Concessions

BOSTON, Dec. 18.—A further contraction in the New England melt of iron is noted, largely because of a slump in jobbing foundry work, and a still further shrinkage is scheduled for Christmas week, inasmuch as some of the largest foundries will be closed from Dec. 22 until Jan. 2. Local furnace representatives are receiving no open inquiries. Business is obtained only by solicitation. The position of the furnaces, therefore, is not so strong notwithstanding their sold up condition. For instance, eastern Pennsylvania iron is obtainable at $26.15 delivered base, with 50c. differentials, although $26.65 is commonly quoted. Buffalo No. 2X resale is offered at $26.91 and No. 1X at $27.91 to $28.41, or 50c. to $1 under regular furnace quotations. Two central Pennsylvania furnaces offer iron at $26.79 delivered base, with 50c. differentials, or a little less than the cheapest Buffalo available. A sale of 500 tons of Buffalo No. 2 plain, first quarter, to a Massachusetts melter at $27.91 delivered represents the largest recent transaction reported locally. A Cape Cod foundry bought 200 tons of Buffalo No. 2X resale at $26.91 delivered. Otherwise business has been in 100 ton lots or smaller and of less volume than the previous week.

We quote delivered prices on the basis of the latest reported sales as follows, having added $3.65 freight from eastern Pennsylvania, $4.91 from Buffalo, $5.92 from Virginia, and $9.60 from Alabama:

East. Penn., sil. 2.25 to 2.75	$26.15 to $28.15
East. Penn., sil. 1.75 to 2.25	26.15 to 26.65
Buffalo, sil. 2.25 to 2.75	26.91 to 27.91
Buffalo, sil. 1.75 to 2.25	26.91 to 27.41
Virginia, sil. 2.25 to 2.75	30.92 to 32.42
Virginia, sil. 1.75 to 2.25	30.92 to 31.92
Alabama, sil. 2.25 to 2.75	31.10
Alabama, sil. 1.75 to 2.25	30.60

Finished Material.—Stone & Webster, Boston, have awarded 2500 tons of structural steel for a Fall River, Mass., power house to the American Bridge Co. No other large awards are expected this year. Warehouses and fabricators, carrying small but well assorted stocks, are buying plain material more freely for first quarter at 2.40c. Pittsburgh base. Occasionally that figure is shaded. Business in bars for first quarter shipment also is picking up, with 2.40c. base generally maintained on steel. Better than that is reported to have been done on iron bars, however. Consumers and warehouses are contracting for first quarter bolt and nut requirements, but such buying is without special feature.

Coke.—Unseasonably warm weather had made for accumulation of crushed cokes in this territory and prices have a downward tendency. The New England Coal & Coke Co. and the Providence Gas Co., however, continue to quote foundry coke on a basis of $12.50 delivered in New England. Specifications against 1923 foundry coke contracts hold up well, and at least one of the producers in this territory is securing shipping instructions from outside New England. For these reasons the company has under consideration plans for putting an additional oven battery on foundry coke production. Little interest is shown by New England foundries in Connellsville cokes.

Old Material.—Aside from a car of No. 1 and No. 2 machinery cast now and then, little material is being purchased by New England melters. There is, however, slightly more inquiry for eastern Pennsylvania shipment, especially for borings and turnings, which average 50c. to $1 a ton higher than a week ago. The demand for chemical borings appears to have died down, but prices hold firm. Forged scrap and bundled skeleton also are in better request, and as high as $10 has again been paid for specially selected forged material, with $9 to $9.50 the most common price paid. Inquiry for heavy melting steel is greater, yet actual transactions are limited, inasmuch as owners are still inclined to hold out for higher prices. On the other hand, little interest is shown in railroad and yard wrought and the market for such materials is largely nominal. Cotton ties, for Pennsylvania consumption, have changed hands within the past day or two at $8 and $8.50 on cars shipping point, which represents a slightly firmer basis.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	$22.00 to $23.00
No. 2 machinery cast	20.00 to 21.00
Stove plates	16.00 to 16.50
Railroad malleable	19.00 to 19.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$12.50 to $13.00
No. 1 railroad wrought	13.00 to 13.50
No. 1 yard wrought	11.00 to 11.50
Wrought pipe (1-in. in diam., over 2 ft. long)	10.50 to 11.00
Machine shop turnings	9.00 to 9.50
Cast iron borings, chemical	10.00 to 10.50
Cast iron borings, rolling mill	9.00 to 9.50
Blast furnace borings and turnings	8.50 to 9.00
Forged scrap and bundled skeleton	9.00 to 9.50
Shafting	16.00 to 16.50
Rails for rolling	12.50 to 13.00

St. Louis

Some Improvement in Demand for Pig Iron at Unchanged Prices

ST. LOUIS, Dec. 18.—The St. Louis Coke & Iron Co. sold 5000 tons of basic pig iron to an East Side melter for first quarter delivery and 2000 tons of car wheel iron to an Illinois melter, also for first quarter delivery, during the last week. Other sales during the week included 200 tons of foundry iron to an Illinois machinery manufacturer and two lots of 300 tons each of charcoal iron to Texas melters. In addition there were sales of carloads up to 100 tons of small totals. Business generally showed an improvement over the previous week. New inquiries before the market include 1000 tons of malleable for a Tennessee melter, 100 tons of low silicon for a Quincy foundry, 700 tons foundry iron for the Louisville & Nashville Railroad and 1000 tons for a Texas melter for first quarter delivery. The Southern market is still at $21 Birmingham, an offer of $20.50 for 350 tons being turned down by a Birmingham maker. Northern iron is quoted at $23 to $23.50 Chicago.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices $2.16 freight from Chicago, $3.28 from Birmingham (rail and water), $5.17 from Birmingham, all rail, and 81 cents average switching charge from Granite City:

Northern fdy., sil. 1.75 to 2.25	$25.16 to $25.66
Northern malleable, sil. 1.75 to 2.25	25.16 to 25.66
Basic	25.16 to 25.66
Southern fdy., sil. 1.75 to 2.25 (rail)	26.17

Finished Iron and Steel.—Fabricators are inquiring for materials, and there is a better feeling in structural steel from this source. The Mississippi Valley Structural Steel Co. got the contract for 1100 tons for the Ford Motor Co. building at Kansas City, Mo. There are very few railroad inquiries, and warehouse business is extremely quiet.

For stock out of warehouse we quote: Soft steel bars, 3.35c. per lb.; iron bars, 3.35c.; structural shapes, 3.45c.; tank plates, 3.45c.; No. 10 blue annealed sheets, 4.10c.; No. 28 black sheets, cold-rolled, one pass, 4.85c.; cold drawn rounds, shafting and screw stock, 4.70c.; structural rivets, 4.15c.; boiler rivets, 4.35c.; tank rivets, ⅞-in. and smaller, 50-5 per cent off list; machine bolts, 45-5 per cent; carriage bolts, 40-5 per cent; lag screws, 50-5 per cent; hot pressed nuts, squares or hexagon blank, $2.50; and tapped, $2.50 off list.

Coke.—The market for coke is quiet. The weather has been more seasonal for the consumption of domestic grades, but not sufficiently so as to cause dealers to enter the market actively.

Old Material.—Prices of old material continue to mount, the advances this week ranging from 50c. to $1.50 per ton. There has been some buying by consumers, notably the purchase of 3000 tons of rerolling rails by a leading factor in the district at $18 per gross ton. Dealers have great faith in the market, and their desire to get material is boosting prices. Railroads continue to get out new lists, including Missouri, Kansis-Texas, 2000 tons; Frisco lines, 2000 tons; Rock

Island, 5000 tons; Wabash, 2000 tons; Southern Pacific, 7500 tons; Louisville & Nashville, 11,000 tons and Norfolk & Western, 20,000 tons. Some of the lines issuing new lists are as much as three months behind in deliveries on old lists. This situation is strengthening the position of the dealers, whose own stocks are low.

	Per Gross Ton	
Iron rails	$16.50 to	$17.00
Rails for rolling	17.50 to	18.00
Steel rails, less than 3 ft.	19.50 to	20.00
Relaying rails, 60 lb. and under	25.00 to	26.00
Relaying rails, 70 and over	32.50 to	33.50
Cast iron car wheels	19.00 to	19.50
Heavy melting steel	16.00 to	16.50
Heavy shoveling steel	15.50 to	16.00
Frogs, switches and guards cut apart	16.50 to	17.00
Railroad springs	19.00 to	19.50
Heavy axles and tire turnings	13.50 to	14.00
	Per Net Ton	
Steel angle bars	15.00 to	15.50
Steel car axles	17.00 to	17.50
Iron car axles	25.00 to	25.50
Wrought iron bars and transoms	19.50 to	20.00
No. 1 railroad wrought	14.00 to	14.50
No. 2 railroad wrought	14.50 to	15.00
Cast iron borings	11.50 to	12.00
No. 1 busheling	14.00 to	14.50
No. 1 railroad cast	17.50 to	18.00
No. 1 machinery cast	18.50 to	19.00
Railroad malleable	16.00 to	16.50
Machine shop turnings	9.00 to	9.50
Champion bundled sheets	9.00 to	9.50

Birmingham

Production of Pig Iron Is Heavy, but Sales Are of Small Tonnages

BIRMINGHAM, ALA., Dec. 18.—While the buying of iron has been tapering off recently as compared to the activity last month, the Southern pig iron market is considered firm and inclined upward. The prospects are that before the end of the month the furnace interests will be asking $22 per ton for No. 2 foundry. Inquiries for iron for second quarter delivery are being received spasmodically, but the deals consummated are not numerous. The producers are not yet willing to accept prices or make concessions on prevailing quotations. The smaller melters are not reducing their operations. In some instances the lay-off for the holiday season will be very brief. Some of the larger consumers of pig iron will take a week to 10 days off, during which time there will be repairing done. The furnace operations are being maintained with the make holding up well. Surplus stock in Alabama has been going down steadily and not much over 80,000 tons of all kinds of iron is estimated on yards here. Smaller consumers, such as stove makers, will be back in the market on the turn of the year. Pig iron of the Birmingham district is being shipped to the Middle West mainly; that is, the iron going outside of the immediate territory. Cast iron pipe makers are the steadiest melters of iron, the sanitary pipe plants in particular. With few exceptions these industries have been operating during the last few weeks on very good schedule, and much of the warehouse stock has been shipped out. Quotations during the month have been around $21. Pig iron production in Alabama during the last month of the year will be equal to that of the month previous, and even October.

We quote per gross ton f.o.b. Birmingham district furnace as follows:

Foundry, silicon 1.75 to 2.25	$21.00
Basic	21.00
Charcoal, warm blast	33.00

Cast Iron Pipe.—Lettings still come in to Southern cast iron pipe makers for various sizes in pipe, both pressure and sanitary pipe, and steady operation is to be seen for an indefinite period to come. The American Cast Iron Pipe Co. reports orders from Kansas City, Mo., for 580 tons, West Monroe, La., for 373 tons and Fort Worth, Tex., for 125 tons. This company has also divided tonnage in Minneapolis and St. Paul. The National Cast Iron Pipe Co. and the United States Cast Iron Pipe & Foundry Co. have steadily participated in the business and are getting their usual share.

4-in. water, $51; 6-in., $47; larger sizes, $46; 4-in. gas, $56; 6-in., $52; standard sanitary pipe, $55; heavy gage, $45.

Coke.—No change has taken place recently in the Southern coke market. Production is decreasing, upward of 75 by-product coke ovens and more than 150 beehive ovens ceasing operation. Quotations remain weak, at about $5 the ton on by-product coke.

Old Material.—A better tone is noted in the Southern scrap iron and steel market. Dealers are not selling into the future very strongly. Plenty of stock is on hand. Quotations remain the same as they were last week. Heavy melting steel lags, while steel axles cut into 3-ft. lengths are finding a little demand at $17.

We quote per gross ton f.o.b. Birmingham district yards, nominal prices, as follows:

Cast iron borings, chemical	$16.00
Heavy melting steel	12.00
Railroad wrought	14.00
Steel axles	17.00
Iron axles	20.00
Steel rails	13.00
No. 1 cast	18.50
Tram car wheels	15.50
Car wheels	15.00
Stove plate	14.00
Machine shop turnings	6.00
Cast iron borings	8.00

San Francisco

Business Generally Dull, but Improvement at Early Date Expected

SAN FRANCISCO, Dec. 12.—Present dullness and uncertainty as to the future seem to be the dominating features of the iron and steel industry in this part of the State for the time being, notwithstanding the fact that there are some good prospects for enlarged trade which may reasonably be counted upon to mature shortly after the close of the year. A close study of the situation shows a continuance of the small improvement noted two weeks ago, but it is confined more to increased inquiries rather than new orders. Purchasers are still backward in placing commitments except such small lots as are necessary for immediate requirements. The dullness of business is clearly shown by the decreased imports of pig iron by sea. During the months of September, October and November of this year the total imports were 2278 tons, while for the same months of last year the total was 7710 tons. Thus far in December there have been no arrivals. In the way of encouragement, traders point to a largely increased volume of railroad, bridge and station work on which figures have recently been given, coupled with public construction, mostly schoolhouses, which makes a much better showing than at this time last year.

Pig Iron.—There is not much change in general conditions, but the inquiries seem to indicate that the business outlook is more satisfactory than it was at this time last month. Importers report that sales for December thus far for future delivery are better than for the last two months. Prices are a trifle easier, the quotable range now being from $32 to $34 per ton, and several lots have recently changed hands within these figures for January delivery. While these lots were around 500 to 600 tons, they seem to be regarded as an indication that consumers have allowed their supplies to get down to a very low quantity and additional buying orders are looked for. There is some tonnage on the way, but none is expected to arrive before the middle of next month. The trading in pig iron has been gradually growing less for the last two months, so that the orders of the past ten days are regarded as an indication that the worst of the dullness is past. Reports from Los Angeles say that while activity is still marked there, it is a little more quiet than two weeks ago.

Finished Steel and Iron.—Both mills and foundries report business fair in volume, and while there is not enough to cause any accumulation of orders, it is sufficient to keep labor forces steadily employed for prompt filling of orders. Stocks of merchant bars in hands of consumers are reported low and prices are firmly held at $3.75, with no small lots selling under $4. The demand for structural steel continues good, with prices held steady. There has been some sale of wire and rods

for shipment to Japan, but this trade has not been up to expectations, the statement being made that the great bulk of this business has been placed with buyers on the Atlantic seaboard. Sales of reinforcing material are reported fairly large for this part of the State, with prices unchanged and firmly held.

Coke.—Buyers are slow in making any commitments outside of the usual routine business. Three cargoes of moderate tonnage are on the way, the first, expected to arrive about Dec. 20, is practically all spoken for. The second will arrive about Jan. 15, and the third some ten days later. The price is a trifle lower than two weeks ago, $21, being now a full figure. There is not much demand, but traders expect improvement early in the new year, probably in January.

Old Material.—Buyers are purchasing in small quantities, and although there has been some concession in prices, it failed to stimulate trade. The quotable range is now $13.50 to $14 for the San Francisco region and from 50c. to $1 lower in the Los Angeles field. The slackening down of the oil industry and the resultant decrease in demand for well equipment has had marked effect on the demand for old material. Receipts are ample for all requirements, and the quoted prices are rather easy. A cargo aggregating some 1200 tons is expected from the Mexican coast within the next week or so.

Buffalo

Furnaces Asking Somewhat Higher Prices—Sales Very Light

BUFFALO, Dec. 18.—Disinterest on the part of pig iron buyers, following the extraordinary buying in November, is further emphasized by holiday quietness. While the greater number of consumers bought first quarter requirements last month, surveys in the district show that considerable iron is to be bought, but that the placing of this will probably go over until the new year. The wide range of prices asked by Buffalo producers has been somewhat shortened; one furnace which did not share to a large extent in the recent buying activity was asking $21.50 as compared with another producer having a comfortable back log, asking $23, base. Recent quotations, however, show the minimum for silicon 1.75 to 2.25 to be $22, quoted by furnaces, but brokers are selling some No. 2X at $22 and No. 1X at $22.50. The practice of considering every inquiry separately before prices are given out is being continued by two sellers. One furnace quoting $22 for silicon 1.75 to 2.25 is asking differentials of $1 on higher silicons, but it is still possible to buy furnace iron on the 50c. differential scale. Total sales are less than 5000 tons. Small tonnages of malleable have been sold at $23, furnace.

We quote f.o.b., gross ton, Buffalo, as follows:

No. 1 foundry, sil. 2.75 to 3.25	$22.50 to $23.00
No. 2 foundry, sil. 2.25 to 2.75	22.00 to 22.50
No. 2 plain, sil. 1.75 to 2.25	21.50 to 22.00
Basic	22.00
Malleable	22.00
Lake Superior charcoal	29.28

Finished Iron and Steel.—Buying for immediate delivery is the only business in this market, and demand for bars, shapes and plates is dull. Of these three products, bars are livelier than the others, but prices on the three lines hold uniformly. Sheet prices are being shaded on orders that call for prompt shipment, and 3.80c. for black and 4.90c. for galvanized have been done where deliveries are to be made this month. On first quarter sheet business, however, the schedule is being observed. Bolt demand is slow, but this quietness is not attributed to the new list of discounts. The whole market is on the threshold of holiday inactivity.

We quote warehouse prices Buffalo as follows: Structural shapes, 3.65c.; plates, 3.65c.; soft steel bars, 3.55c.; hoops, 4.65c.; bands, 4.35c.; blue annealed sheets, No. 10 gage, 4.30c.; galvanized steel sheets, No. 28 gage, 6.10c.; black sheets, No. 28 gage, 5c.; cold rolled round shafting, 4.45c.

Old Material.—Between 10,000 and 15,000 tons of heavy melting steel have been sold. Demand outside the district is better for all scrap. Some of the steel tonnages were for immediate delivery, the buyers finding that they had almost reduced their stocks to the point of exhaustion.

We quote f.o.b., gross ton, Buffalo, as follows:

Heavy melting steel	$17.50 to $18.00
Low phos., 0.04 and under	20.00 to 21.00
No. 1 railroad wrought	14.00 to 15.00
Car wheels	18.00 to 18.50
Machine shop turnings	10.00 to 11.00
Cast iron borings	12.50 to 13.00
No. 1 busheling	14.00 to 15.00
Stove plate	17.00 to 17.25
Grate bars	16.00 to 16.50
Bundled sheet stampings	10.00 to 11.00
Hydraulic compressed	14.00 to 14.50
Railroad malleable	19.50 to 20.50
No. 1 machinery cast	19.50 to 20.50

Cleveland

Heavy Buying of Steel by Automobile Companies

CLEVELAND, Dec. 18.—Buying by the automobile industry reported under way last week has continued and during the past few days a heavy tonnage was placed in various steel products. Much additional business from the same source is under negotiation. Most of the automobile companies are buying for three months' requirements and are arranging their schedules for large production. The Ford Motor Co. is taking up purchases of one line of steel products at a time, and during the week placed close to 30,000 tons of steel. This is in addition to a round tonnage of alloy steel purchases previously reported and does not include sheets. A Cleveland manufacturer of automobile parts has purchased 12,000 tons of carbon and 6000 tons of silicon manganese steel covering its first half requirements. A leading Cleveland automobile company has placed orders directly for steel or for parts for 10,000 cars covering a schedule production for about four months and a great deal of business in forging and other parts is being placed with parts manufacturers. Large orders have also been placed for special sections for tire bases and rims for passenger car and truck wheels. The Ford Motor Co. has advised suppliers of material that its plant will be shut down for inventory only from Dec. 28 to Jan. 1. Outside of the automobile industry considerable business has been placed in first quarter contracts, largely for bars, and some of the contracts are for the first half. There is also an increase in the demand for small lot orders to fill in depleted stocks. Sentimentally the market shows a marked improvement and prices on some lines display firmer tendency. In structural steel, the outstanding award of the week was the placing of 6400 tons of steel for the Brotherhood of Locomotive Engineers bank and office building, Cleveland, to the Bethlehem Steel Co. An unusually large amount of structural work is being figured on for this season of the year. The plate market continues quiet, with no change in the recent price spread of 2.40c. to 2.50c. Hot-rolled strip steel is firmer, but a good tonnage would probably still bring out a 2.75c. price for wide sections. Hoop and band mills are trying to hold to 3c.

Jobbers quote steel bars, 3.36c.; plates and structural shapes, 3.46c.; No. 28 black sheets, 4.40c. to 4.65c.; No. 28 galvanized sheets, 5.60c. to 5.80c.; No. 10 blue annealed sheets, 3.60c. to 4c.; cold rolled rounds, 3.90c.; flats, squares and hexagons, 4.40c.; hoops and bands, 1 in. and wider and 20 gage or heavier, 4.16c.; narrower than 1 in. or lighter than No. 20 gage, 4.66c.; No. 9 annealed wire, $3.50 per 100 lb.; No. 9 galvanized wire, $3.95 per 100 lb.; common wire nails, $3.60 base per 100 lb.

Pig Iron.—There is little activity, as most consumers are under contract, and those who have not yet bought are disposed to wait until the first of the year. However, some small lot sales are being made and the volume of business is fully as good as it was previous to the recent buying movement. One producer reports several sales during the week aggregating 3000 tons.

A number of new inquiries have come out, including one for 2000 tons of malleable iron and another for 500 tons of foundry iron. The promising outlook in the automobile field indicates further buying by automobile foundries. One maker of automobile equipment who had previously purchased a round tonnage of iron placed 500 tons additional during the week. In steel making grades, local producers have quoted on the inquiry for 7000 tons of basic iron from the Follansbee Bros. Co. and an inquiry for 5000 tons of basic iron has come from a Canton consumer. Prices are firm and show little change. The usual quotation on foundry iron by lake furnaces is $22.50, although one 500-ton lot was sold to a nearby consumer at $24. In Cleveland $22.50 at furnace is still quoted for foundry iron for local delivery, although one producer is asking $23. Valley quotations on foundry and malleable iron range from $22 to $22.50. Consumers generally are taking all their iron on contract and December shipments show a gain over November.

Quotations below, except on basic and low phosphorus iron, are delivered Cleveland, and for local iron include a 50c. switching charge. Ohio silvery and Southern iron prices are based on a $3.02 freight rate from Jackson and $6 rate from Birmingham:

Basic, Valley furnace	$21.00
Northern No. 2 fdy., sil. 1.75 to 2.25	23.00
Southern fdy., sil. 1.75 to 2.25	27.00
Malleable	23.00
Ohio silvery, 8 per cent	35.52
Standard low phos., Valley furnace	$29.00 to 30.00

Sheets.—Considerable additional business in automobile body sheets was booked during the week. The Ford Motor Co., which inquired for 30,000 tons for the first quarter, is understood to have purchased a large part of that tonnage. While there are intimations that this company was able to secure concessions from the 5.35c. price, there is no definite confirmation of this. Although the sheet market is firmer, some of the mills are taking black sheets at 3.75c. for January rolling, and concessions of $2 a ton to 2.90c. are still being made on blue annealed sheets. Consumers, as a rule, are not inclined to buy for extended requirements, although some have placed first quarter contracts at regular prices.

Reinforcing Bars.—Bids will be taken Dec. 21 for 600 tons for the Buhl Building at Detroit. The Brotherhood of Locomotive Engineers' Building, Cleveland, will require 480 tons, which will probably be placed this week. Prices on soft steel reinforcing bars lack firmness, due probably to the competition of rerolled bars. Quotations as low as 2.30c. are not uncommon on the former, and a desirable order would probably bring out a 2.25c. price. Rail steel bars are unchanged at 2.10c.

Semi-Finished Steel—Consumers are holding back in placing sheet bars for the first quarter, not being satisfied that the regular $42.50 price will hold, but no concessions from this price are being made. A number of inquiries are pending. A leading local producer has taken several first quarter contracts, subject to prices prevailing at time of shipment.

Bolts, Nuts and Rivets.—A good volume of bolt and nut business has come out in first quarter contracts at regular prices, which are firmly held. Current orders are fair for this time of the year. Rivets are firm at 2.90c. Some consumers are placing rivet contracts for the first quarter.

Coke.—There is a fair volume of activity in foundry coke contracts for the first quarter and first half. Contract business is being placed at $6.50 for high grade Connellsville fuel and at $6.75 for Wise County coke. Quotations for Connellsville foundry coke for spot shipment range from $5 to $6.50.

Old Material.—The market became more active during the week and rather large tonnages of heavy melting steel, machine shop turnings and mixed borings and turnings were purchased by northern Ohio mills. One Cleveland consumer bought a round tonnage of heavy melting steel and another a small tonnage of turnings. Prices paid were $17.50 to $18 for heavy melting steel and $14 for machine shop turnings and mixed borings and turnings. The buying has subsided and not much activity is expected during the remainder of the year, as some of the mills will defer purchasing until January. The market is very firm and dealers have paid as high as $14.50 for mixed borings and turnings. Dealers also during the advancing market have been compelled to pay for other grades more than prices at which they have made sales. Prices are unchanged with the exception of an advance of 50c. a ton on old rails and flashings.

We quote dealers' prices f.o.b. Cleveland per gross ton:

Heavy melting steel	$16.50 to $17.00
Rails for rolling	17.25 to 17.75
Rails under 3 ft	17.50 to 17.75
Low phosphorus melting	18.50 to 19.00
Cast borings	13.25 to 13.50
Machine shop turnings	12.50 to 13.00
Mixed borings and short turnings	13.25 to 13.75
Compressed sheet steel	13.25 to 13.75
Railroad wrought	15.00 to 16.00
Railroad malleable	19.75 to 20.25
Light bundled sheet stampings	11.25 to 11.50
Steel axle turnings	14.00 to 14.50
No. 1 cast	21.00 to 22.00
No. 1 busheling	13.00 to 13.25
Drop forge flashings	13.25 to 13.50
Railroad grate bars	18.00 to 18.50
Stove plate	18.00 to 18.50
Pipes and flues	13.00 to 13.50

Philadelphia

Activity in Steel and Pig Iron at Low Ebb—Steel Scrap Sold at $17.50

PHILADELPHIA, Dec. 18.—With inventory period at hand the eastern Pennsylvania steel and pig iron trade finds buying activity almost at the minimum for the year, and the general attitude is one of watchful waiting for what the new year may bring forth. The pig iron market is as dull as it was before the inception of the recent large buying movement, while finished steel consumers and jobbers are putting off salesmen with the excuse that they will wait until January before considering any further orders beyond the merest needs of the moment. Steel companies which have had on their books unfilled fourth quarter contracts with customers have generally been able to obtain specifications in full with the understanding that shipments are not to be made until after Jan. 1.

The scrap market is the only branch of the trade that shows any real activity. An Eastern steel company bought 12,000 tons of heavy melting steel at $17.50, the highest price obtained in this market since July last.

Pig Iron.—Eastern Pennsylvania furnaces generally have enough business on their books to carry them pretty well through the first quarter; hence there is no disquietude over the fact that business has dropped to almost nothing following the recent buying movement. Prices are well maintained at $23, base, for foundry grades, and on carload lots, which have made up the bulk of the limited sales of the past week, $23.50, base, has been obtained by some furnaces. No further demand for basic has developed beyond the 3000-ton sale reported a week ago. A fair demand for low phosphorus exists, but domestic furnaces are compelled to meet the competition of foreign iron, which is now being offered at $27.50 and $28, f.o.b. cars, Philadelphia. Domestic furnaces quote about the same prices, but have higher freight rates to some consuming points in the Philadelphia district. The Hokendauqua furnace of the Reading Iron Co. will remain in blast and has bought its coke supply for first quarter.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76 cents to $1.63 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$23.76 to $24.13
East. Pa. No. 2X, 2.25 to 2.75 sil.	24.26 to 24.63
East. Pa. No. 1X	24.76 to 25.13
Virginia No. 2 plain, 1.75 to 2.25 sil.	29.17 to 30.17
Virginia No. 2X, 2.25 to 2.75 sil.	30.17 to 30.67
Basic delivered eastern Pa.	23.25 to 23.50
Gray forge	23.00 to 23.50
Malleable	24.25 to 24.50
Standard low phos. (f.o.b. furnace)	27.50 to 28.00
Copper bearing low phos. (f.o.b. furnace)	28.00

Ferroalloys.—One domestic producer of ferromanganese now holds firmly to $109, furnace, as its minimum quotation, while another is disinclined to sell below $115, having enough orders on hand to satisfy its immediate desires. English ferromanganese at $110, seaboard, is being neglected on account of the lower domestic prices.

Semi-Finished Steel.—A sale of 500 tons of forging billets at $45, Pittsburgh, is the first transaction of importance to test the market in some weeks. Rerolling billets are quoted at $40, Pittsburgh.

Plates.—Some of the Eastern plate mills will be shut down on Saturday, to remain idle until Jan. 2. Plate orders are being received in driblets not sufficient in the aggregate to give any of the mills a satisfactory operation. With few inquiries for more than a carload to 100 tons, there is no real test of prices. Nearly all mills quote 2.40c., Pittsburgh, on the small volume of current business.

Structural Material.—While the Philadelphia district is not furnishing much plain material tonnage to the mills, other districts have shown a notable improvement in business and the leading Eastern independent is in better position as to backlog than it has been in months. Prices show no marked weakness, the situation being about the same as in recent weeks, plain material being available at 2.35c. to 2.50c., Pittsburgh, according to the mill and the character and size of the specification.

Bars.—Steel bar makers are holding firmly to 2.40c., Pittsburgh, the only deviation from this price apparently being on reinforcing steel, which occasionally is sold at 2.30c. Eastern bar iron mills have announced a reduction of $1 a ton to 2.30c., Pittsburgh.

Bolts, Nuts and Rivets.—Discounts on bolts, nuts and rivets for first quarter contracts are now on the basis of 60 and 10 per cent off list on large machine bolts, cut threads, with the usual differentials on allied items.

Old Material.—A sale of 12,000 tons of heavy melting steel to an Eastern steel company at $17.50 delivered has advanced scrap prices another notch, several grades being 50c. or more higher than a week ago. Another sale in the Pittsburgh district at $19 delivered has had a strengthening effect also on this market. Interstate Commerce Commission Order No. 20 has superseded I. C. C. A59, putting into effect Dec. 26 an advance in freight rates on scrap from Boston rate points to points in the Pittsburgh district. The present rate of $5.53 will become $5.57 over the Pennsylvania Lines and $5.70 over other lines.

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	$17.00 to $17.50
Scrap rails	17.00 to 17.50
Steel rails for rolling	19.00 to 19.50
No. 1 low phos., heavy 0.04 and under	22.00 to 23.00
Couplers and knuckles	20.00 to 21.00
Cast-iron car wheels	19.50 to 20.00
Rolled steel wheels	20.00 to 21.00
No. 1 railroad wrought	18.50 to 19.00
No. 1 yard wrought	16.00 to 17.00
No. 1 forge fire	14.50 to 15.00
Bundled sheets (for steel works)	14.50 to 15.00
Mixed borings and turnings (for blast furnace use)	12.00 to 13.00
Machine shop turnings (for steel works use)	14.50 to 15.00
Machine shop turnings (for rolling mill use)	15.00 to 15.50
Heavy axle turnings (or equivalent)	15.00 to 15.50
Cast borings (for steel works and rolling mills)	14.00 to 15.00
Cast borings (for chemical plants)	15.00 to 16.00
No. 1 cast	20.00 to 21.00
Heavy breakable cast (for steel plants)	18.00 to 18.50
Railroad grate bars	17.00 to 17.50
Stove plate (for steel plant use)	17.00 to 17.50
Railroad malleable	18.00 to 18.50
Wrought iron and soft steel pipes and tubes (new specifications)	16.50 to 17.00
Shafting	22.00 to 22.50
Steel axles	22.00 to 22.50

Sheets.—A leading Eastern maker of blue annealed sheets has booked a few first quarter contracts at 3c., Pittsburgh. Black and galvanized sheets are not so firmly held, and there are reports of concessions of $2 and $3 a ton from the so-called regular quotations of 3.85c. for black and 5c. for galvanized.

Warehouse Business.—Consumers are piecing out their year-end requirements with items from jobbers' stocks, and there is a fair volume of warehouse business. Prices are unchanged, and for local delivery are as follows:

Soft steel bars and small shapes, 3.47c.; iron bars (except bands), 3.47c.; round edge iron, 3.75c.; round edge steel, iron finished, 1½ x ½ in., 3.75c.; round edge steel planished, 4.55c.; tank steel plates, ¼ in. and heavier, 3.57c.; tank steel plates, ⅜ in., 3.82c.; blue annealed steel sheets, No. 10 gage, 4.10c.; black sheets, No. 28 gage, 5.15c.; galvanized sheets, No. 28 gage, 6.25c.; square twisted and deformed steel bars, 3.57c.; structural shapes, 3.57c.; diamond pattern plates, ¼-in., 5.40c.; ⅜-in., 5.60c.; spring steel, 5c.; round cold-rolled steel, 4.35c.; squares and hexagons, cold-rolled steel, 4.85c.; steel hoops, 1 in. and wider, No. 20 gage and heavier, 4.27c.; narrower than 1 in., all gages, 4.77c.; steel bands, No. 12 gage to ⅜-in., inclusive, 4.27c.; rails, 3.47c.; tool steel, 8.50c.; Norway iron, 7c.

Coke.—Pressure to sell blast furnace coke for shipment before the end of the year has brought some quotations as low as $3.90, Connellsville. For first quarter the price situation is unchanged, $4.50 to $5 being quoted. Foundry coke is available at $4.75 to $5.50, ovens, according to grade.

Youngstown Scrap Market

YOUNGSTOWN, Dec. 18—More activity is reported this week by dealers in scrap, involving chiefly the heavy grades. A number of sales, involving small-lot tonnages, were closed within the past few days, while melters are putting forth inquiries for tonnage required during the first quarter of 1924.

In view of the recent activity in scrap in nearby districts, involving the heavy melting grades, this grade is now quotable at $19 in the Mahoning Valley, an increase of $1 per ton within the past two weeks, and comparing with a range from $17 to $17.50 three weeks ago.

Dealers here are inclined to believe that the current market of $19 is firm, and are bidding up on supplies to cover short sales. One of the leading interests, however, states that it is not among those reported to have bid from $18.50 to $18.75, and states that it is not inclined to go to this figure at this time.

Other grades of scrap have not been materially affected by the advance in heavy melting. Compressed sheet steel is held at $16.50 maximum, machine shop turnings at $14 and cast iron borings at $14.

Pennsylvania to Improve Erie Ore Docks

The Pennsylvania Railroad has provided for enlargement of coal and ore-handling facilities at its docks at Parade Street, Erie, Pa., and has purchased the necessary equipment, including a Mead-Morrison unloader. Cost of the improvements, as stated by an official of the railroad, will be $80,000. The dock at present is equipped with one electric Hulett and one Mead-Morrison combination bridge and unloader with 10-ton and 9-ton buckets respectively. Present capacity is 16,000 tons of ore per 20-hr. day, and there is storage capacity for 300,000 tons.

The November wage distribution of $6,928,981 by Youngstown industries represents a decline of $54,889, as compared with the October disbursements, but is a gain of $1,189,524 over November, 1922. For the first 11 months of this year, the city's industries have paid $71,244,679 in wages, comparing with $54,046,347 distributed during the 12 months of 1922 and $50,384,741 paid in 1921. An annual payroll for 1923 of $77,000,000 is forecast, the second largest in the history of the city and comparing with $94,000,000, distributed in 1920.

British Iron and Steel Market

Pig Iron Firm and Active; Steel Strong—Large Rail and Car Orders Placed—Ruhr Plates Offered at Low Price

(*By Cable*)

LONDON, ENGLAND, Dec. 18.

Though the holidays are near, pig iron is firm and active. There is particularly keen demand for hematite for the domestic trade. Two additional furnaces have been blown in, making a total of 46 Cleveland furnaces now operating, including 14 on foundry and forge iron, 16 on hematite and 16 on other grades.

Hematite is advancing though supplies are increasing. Foreign ore is quieter. Sellers of Bilbao Rubio ask 24s. ($5.26); buyers offer 23s. ($5.04) c.i.f. Tees.

Exports for November include 47,437 tons of pig iron and a total of 394,891 tons of iron and steel.

Steel is strong, with an upward tendency on increased domestic bookings. The plate rollers are well filled for four to eight weeks. There are good Continental inquiries but little business resulting. Export buying generally is poor.

Rail orders to the amount of £1,000,000 ($4,380,000) have been placed by the London, Midland, Scottish Railroad; also £1,000,000 in mineral wagons (coal and ore cars). The Indian railroads are buying 285 cars from the Metropolitan Railway Wagon Co.

Continental steel is weaker but prices are not yet sufficiently low to attract buyers. There is some Indian demand on a fair scale.

British works have bought basic pig iron at £4 11½s. ($20.04) f.o.b. Hamburg. Sheet bars are being sold at £6 13½s. ($29.24) f.o.b. Antwerp. The German Ruhr works are offering plates at £7 15s. (1.51c. per lb.) f.o.b.

Tin plate demand is less excited but buying still is good for both domestic and export trade. The works are well sold up.

Galvanized sheets are weak on the appearance of needy sellers but the works generally are well filled. The main overseas demand is sluggish.

Japanese demand for black sheets is spreading over March but makers have little to sell before April, May and June. Merchants are securing premiums for thin sheets for early shipment.

We quote per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at $4.38 per £1, as follows:

Durham coke, delivered	£1	18½s.	to £1	19s.		$8.43	to	$8.54
Bilbao Rubio ore†	1	4				5.26		
Cleveland No. 1 foundry	5	6½				23.32		
Cleveland No. 3 foundry	5	0				21.90		
Cleveland No. 4 foundry	4	19				21.68		
Cleveland No. 4 forge	4	18				21.46		
Cleveland basic	5	0				21.90		
East Coast mixed	5	2½	to 5	3½		22.45	to	22.67
East Coast hematite	4	19	to 5	0		21.68	to	21.90
Ferromanganese	17	0				74.46		
Ferromanganese*	17	0				74.46		
Rails, 60 lb. and up	8	15	to 9	15		38.32	to	42.70
Billets	8	5	to 8	15		36.13	to	38.32
Sheet and tin plate bars, Welsh	8	18¾				39.15		
Tin plates, base box	1	3¾	to 1	4¼		5.20	to	5.31
						C. per Lb.		
Ship plates	9	10	to 10	0		1.86	to	1.95
Boiler plates	13	0	to 13	10		2.54	to	2.64
Tees	10	0	to 10	10		1.95	to	2.05
Channels	9	5	to 9	15		1.81	to	1.91
Beams	9	0	to 9	10		1.76	to	1.86
Round bars, ¾ to 3 in.	10	5	to 10	15		2.00	to	2.10
Galvanized sheets, 24 g.	18	12½				3.64		
Black sheets, 24 gage	14	0				2.74		
Black sheets, Japanese specifications	15	5				2.98		
Steel hoops	12	10	& 12	15*		2.44	&	2.49*
Cold rolled steel strip, 20 gage	17	12½				3.45		
Cotton ties, Indian specifications	15	0				2.93		

*Export price. †Ex-ship, Tees, nominal.

Continental Prices, All F. O. B. Channel Ports

(*Nominal*)

Foundry pig iron:								
Belgium	£4	13½s.	to £4	15s.		$20.47	to	$20.80
France	4	13½	to 4	15		20.47	to	20.80
Luxemburg	4	13½	to 4	15		20.47	to	20.80
Billets (nominal):								
Belgium	6	7½				27.92		
France	6	7½				27.92		
Merchant bars:						C. per Lb.		
Belgium	7	10	to 8	0		1.47	to	1.56
Luxemburg	7	10	to 8	0		1.47	to	1.56
France	7	10	to 8	0		1.47	to	1.56
Joists (beams):								
Belgium	6	18¾	to 7	2½		1.36	to	1.39
Luxemburg	6	18¾	to 7	2½		1.36	to	1.39
France	6	18¾	to 7	2½		1.36	to	1.39
Angles:								
Belgium	8	0	to 8	5		1.56	to	1.61
⅛-in. plates:								
Belgium	7	17½	to 8	2½		1.54	to	1.59
Germany	7	17½	to 8	2½		1.54	to	1.59
¼-in. plates:								
Luxemburg	7	17½	to 8	2½		1.54	to	1.59
Belgium	7	17½	to 8	2½		1.54	to	1.59

Domestic Steel Demand Increasing—More Blast Furnaces Blowing In

LONDON, ENGLAND, Nov. 29.—Though the country is in the throes of the election, the iron and steel trades in general have suffered little ill effects, and in fact some of the works are now busier than they have been for several months past. The end of the boilermakers' dispute is, in part, responsible for the stimulus, releasing as it has many important shipbuilding jobs, which had either been held back, or which were partly under construction. The home demand for raw materials has broadened considerably, and one or two makers have found it opportune to put more furnaces in blast. Overseas buying of pig iron has also appeared, but in no large proportion, though some fair quantities have been sold on continental account, but the backbone at the present time is in the home demand from steel works. No. 3 Cleveland is held for 100s. and indications point to this level being exceeded in the near future. Hematite has also been enjoying improved conditions and some good sales have been made to home consumers for deliveries spreading well forward. The price of East Coast Mixed Numbers is about 101s. 6d. upward.

As mentioned above, there is more doing in the steel trade. The shipyards are beginning to get back to work again, with the result that very recently plate makers have received orders sufficient to keep them rolling for a month or more. Railroad material is also being called for, and further contracts are being placed. Demand for specialties continues a prominent feature, tinplates in particular being in strong request and changing hands at advancing prices. The basis price now is in the neighborhood of 24s., f.o.b. Galvanized sheet makers are busy, mainly on their Far Eastern contracts booked some time ago, and have little to spare for the first quarter of next year. It is interesting to note, also, that the South Durham Iron & Steel Co. has been contemplating diversifying its manufactured products and has made arrangements to erect a new plant for the rolling of galvanized sheets, while there has also been talk of tinplate production, but so far only the galvanized has been arranged. This plant is situated in the north of England and will, therefore, be a competitor with Welsh producers.

The Metropolitan Vickers Electrical Co., a subsidiary of Vickers, Ltd., has been awarded a contract by the Soviet Government for the supplying of certain electrical apparatus for electric power stations, which are at present under construction in Russia.

The Compressed Gas Manufacturers' Association, New York, will hold its eleventh annual meeting and dinner on Jan. 21. On Jan. 22 and 23 various group meetings will be held. The association represents the manufacturers of all industrial gases.

Prices Finished Iron and Steel f.o.b. Pittsburgh

Carload Lots

Plates

Sheared, tank quality, base, per lb.....2.50c.

Structural Materials

Beams, channels, etc., base, per lb.....2.50c.
Sheet piling .....2.65c.

Iron and Steel Bars

Soft steel bars, base, per lb.....2.40c.
Soft steel bars for cold finishing.....$3 per ton over base
Reinforcing steel bars, base.....2.40c.
Refined iron bars, base, per lb.....3.10c. to 3.15c.
Double refined iron bars, base, per lb.....4.75c.
Stay bolt iron bars, base, per lb.....7.75c. to 8c.

Hot-Rolled Flats

Hoops, base, per lb.....3c.
Bands, base, per lb.....3c.
Strips, base, per lb.....2.75c. to 3c.

Cold-Finished Steel

Bars and shafting, base, per lb.....3c.
Bars, S. A. E. Series, No. 2100.....4.75c.
Bars, S. A. E. Series, No. 2300.....6.25c. to 6.50c.
Bars, S. A. E. Series, No. 3100.....5.25c. to 5.50c.
Strips, base, per lb.....5.00c.

Wire Products

Nails, base, per keg.....$3.00
Galvanized nails, 1 in. and over.....$2.25 over base
Galvanized nails, less than 1 in..... 2.50 over base
Bright plain wire, base, No. 9 gage, per 100 lb.....$2.75
Annealed fence wire, base, per 100 lb..... 2.90
Spring wire, base, per 100 lb..... 3.70
Galvanized wire, No. 9, base, per 100 lb..... 3.35
Galvanized barbed, base, per 100 lb..... 3.80
Galvanized staples, base, per keg..... 3.80
Painted barbed wire, base, per 100 lb..... 3.45
Polished staples, base, per keg..... 3.45
Cement coated nails, base, per count keg..... 2.70
Bale ties, carloads to jobbers.....75 and 2½ per cent off list
Woven fence, carloads (to jobbers).....67½ per cent off list
Woven fence, carloads (to retailers).....65 per cent off list

Bolts and Nuts

Machine bolts, small, rolled threads,
60, 10 and 10 per cent off list
Machine bolts, all sizes, cut threads..60 and 10 per cent off list
Carriage bolts, ⅜ x 6 in.:
Smaller and shorter, rolled threads.60 and 10 per cent off list
Carriage bolts, cut threads, all sizes.....60 per cent off list
Lag bolts .....65 and 10 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads...50 and 10 per cent off list
Other style heads.....20 per cent extra
Machine bolts, c.p.c. and t. nuts, ⅜ x 4 in.,
50 and 10 per cent off list
Larger and longer sizes.....50 and 10 per cent off list
Hot pressed square or hex. nuts, blank.....4.50c. off list
Hot pressed nuts, tapped.....4.50c. off list
C.p.c. and t. square or hex. nuts, blank.....4.00c. off list
C.p.c. and t. square or hex. nuts, tapped.....4.00c. off list
Semi-finished hex. nuts:
⅝ in. and smaller, U. S. S.....80 and 5 per cent off list
⅝ in. and larger, U. S. S.....75 and 5 per cent off list
Small sizes, S. A. E.....80, 10 and 5 per cent off list
S. A. E., ⅝ in. and larger.....75, 10 and 5 per cent off list
Stove bolts in packages.....75, 10 and 5 per cent off list
Stove bolts in bulk.....75, 10, 5 and 2½ per cent off list
Tire bolts .....60 and 10 per cent off list
Bolt ends with hot pressed nuts.....60 and 5 per cent off list
Turnbuckles, with ends, ½ in. and smaller,
50 to 55 and 5 per cent off list
Turnbuckles, without ends, ½ in. and smaller,
65 and 5 to 70 and 10 per cent off list
Washers .....5c. to 5.25c. off list

Semi-Finished Castellated and Slotted Nuts

(To jobbers and consumers in large quantities f.o.b. Pittsburgh.)

	Per 1000 S. A. E.	Per 1000 U. S. S.		Per 1000 S. A. E.	Per 1000 U. S. S.
¼-in.	$4.80	$4.80	⅞-in.	$15.00	$15.00
5/16-in.	5.50	6.00	1-in.	19.50	20.00
⅜-in.	6.50	7.00	1¼-in.	28.50	28.50
7/16-in.	9.00	9.50	1⅜-in.	37.00	37.50
½-in.	11.00	11.50	1½-in.	58.50	60.50

Larger sizes—Prices on application.

Cap and Set Screws

Milled square and hex. head cap screws.....70 per cent off list
Milled set screws.....70 per cent off list
Upset cap screws.....75 and 10 per cent off list
Upset set screws.....75 and 10 per cent off list
Milled studs .....50 and 10 per cent off list

Rivets

Large structural and ship rivets, base, per 100 lb.....$2.90
Small rivets .....65, 10 and 5 off list

Track Equipment

Spikes, ⅜ in. and larger, base, per 100 lb.....$3.00 to $3.15
Spikes, ½ in., 7/16 in. and ⅝ in., per 100 lb..... 3.15 to 3.25
Spikes, ¼ in..... 3.15 to 3.25
Spikes, boat and barge, base, per 100 lb..... 3.25 to 3.50
Track bolts, ¾ in and larger, base, per 100 lb.. 4.00 to 4.25
Track bolts, ½ in. and ⅝ in., base, per 100 lb.. 5.00 to 5.50
Tie plates, per 100 lb..... 2.55 to 2.60
Angle bars, base, per 100 lb..... 2.75

Welded Pipe

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	45	19½	¼ to ⅝	+11	+39
¼ to ⅜	51	25½	½	22	2
½	56	42½	¾	28	11
¾	60	48½	1 to 1½	30	13
1 to 3	62	50½			

Lap Weld

2	55	43½	2	23	7
2½ to 6	59	47½	2½	26	11
7 and 8	56	43½	3 to 6	28	13
9 and 10	54	41½	7 to 12	26	11
11 and 12	53	40½			

Butt Weld, extra strong, plain ends

⅛	41	24½	2 to 3	61	50½
¼ to ⅜	47	30½	¼ to ⅜	+19	+54
½	53	42½	½	21	7
¾	58	47½	¾	28	12
1 to 1½	60	49½	1 to 1½	30	14

Lap Weld, extra strong, plain ends

2	53	42	2	23	9
2½ to 4	57	46½	2½ to 4	29	15
4½ to 6	56	45½	4½ to 6	28	14
7 to 8	52	39½	7 to 8	21	7
9 and 10	45	32½	9 to 12	16	2
11 and 12	44	31½			

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 per cent on black and 1½ points, with a supplementary discount of 5 per cent on galvanized.

Boiler Tubes

Lap Welded Steel		*Charcoal Iron*	
2 to 2¼ in.....	27	1½ in.	+18
2½ to 2¾ in.....	37	1¾ to 1⅞ in.....	+ 8
3 in.	40	2 to 2¼ in.....	— 2
3¼ to 3¾ in.....	42½	2½ to 3 in.....	— 7
4 to 13 in.....	46	3¼ to 4½ in.....	— 9

Less carload lots 4 points less.

Standard Commercial Seamless Boiler Tubes
Cold Drawn

1 in.	55	3 and 3¼ in.....	36
1¼ and 1½ in.....	47	3½ and 3¾ in.....	37
1¾ in.	31	4 in.	41
2 and 2¼ in.....	22	4½ in. and 5 in.....	33
2½ and 2¾ in.....	32		

Hot Rolled

3 and 3¼ in.....	38	4 in.	43
3½ in. and 3¾ in....	39		

Less carloads, 4 points less. Add $8 per net ton for more than four gages heavier than standard. No extras for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be sold at mechanical tube list and discount. Intermediate sizes and gages not listed take price of net larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Carbon under 0.30, base.....83 per cent off list
Carbon 0.30 to 0.40, base.....81 per cent off list
Plus usual differentials and extras for cutting. Warehouse discounts range higher.

Seamless Locomotive and Superheater Tubes

	Cents per Ft.		Cents per Ft.
2-in. O.D. 12 gage....	15	2¼-in. O.D. 10 gage..	20
2-in. O.D. 11 gage....	16	3-in. O.D. 7 gage.....	35
2-in. O.D. 10 gage....	17	1½-in. O.D. 9 gage...	15
2¼ in. O.D. 12 gage..	17	5⅝-in. O.D. 9 gage...	55
2¼-in. O.D. 11 gage..	18	5½-in. O.D. 9 gage...	57

Tin Plate

Standard cokes, per base box.....$5.50

Terne Plate

(Per Package, 20 x 28 in.)

8-lb. coating, 100 lb. base	$11.00	20-lb. coating I. C....	$14.90
8-lb. coating I. C....	11.30	25-lb. coating I. C....	16.20
12-lb. coating I. C....	12.70	30-lb. coating I. C....	17.35
15-lb. coating I. C....	13.95	35-lb. coating I. C....	18.35
		40-lb. coating I. C....	19.35

Sheets

Blue Annealed

Nos. 9 and 10 (base), per lb.....2.90c. to 3c.

Box Annealed, One Pass Cold Rolled

No. 28 (base), per lb.....3.75c. to 3.85c.

Automobile Sheets

Regular auto body sheets, base (22 gage), per lb.....5.35c.

Galvanized

No. 28 (base), per lb.....4.90c. to 5c.

Long Ternes

No. 28 gage (base), 8-lb. coating, per lb.....5.30c.

Tin-Mill Black Plate

No. 28 (base), per lb.....3.85c.

Prices of Raw Materials, Semi-Finished and Finished Products

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Old range Bessemer, 55 per cent iron	$6.45
Old range non-Bessemer, 51½ per cent iron	5.70
Mesabi Bessemer, 55 per cent iron	6.20
Mesabi non-Bessemer, 51½ per cent iron	5.55

Foreign Ore, per Unit, c.i.f. Philadelphia or Baltimore

Iron ore, low phos., copper free, 55 to 58 per cent iron in dry Spanish or Algerian	11.00c.
Iron ore, Swedish, average 66 per cent iron	9.50c.
Manganse ore, washed, 51 per cent manganese, from the Caucasus, nominal	41c.
Manganese ore, ordinary, 48 per cent manganese, from the Caucasus	38c.
Manganese ore, Brazilian or Indian, nominal	42c.
Tungsten ore, per unit, in 60 per cent concentrates	$8.25 to $10.00
Chrome ore, basic, 48 per cent Cr_2O_3, crude, per ton, c.i.f. Atlantic seaboard	18.00 to 28.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2, New York	75c. to 85c.

Ferroalloys

Ferromanganese, domestic, 80 per cent, furnace, or seaboard, per ton	$109.00 to $110.00
Ferromanganese, British, 80 per cent, f.o.b. Atlantic port, duty paid	110.00
Ferrosilicon, 50 per cent, delivered	75.00
Ferrotungsten, per lb. contained metal	85c. to 90c.
Ferrochromium, 4 to 6 per cent carbon, 60 to 70 per cent Cr. per lb. contained Cr. delivered	11c. to 12c.
Ferrochromium, 6 to 7 per cent carbon, 60 to 70 per cent Cr., per lb.	10c. to 11c.
Ferrovanadium, per lb. contained vanadium	$3.50 to $4.00
Ferrocarbontitanium, 15 to 18 per cent, per net ton	200.00

Spiegeleisen, Bessemer Ferrosilicon and Silvery Iron

(Per gross ton furnace unless otherwise stated)

Spiegeleisen, domestic, 19 to 21 per cent	$38.00 to $39.00
Spiegeleisen, domestic, 16 to 19 per cent	37.00 to 38.00

Ferrosilicon, Bessemer, 10 per cent, $41.50; 11 per cent, $44; 12 per cent, $46.50.

Silvery iron, 6 per cent, $30.00; 7 per cent, $31.00; 8 per cent, $32.50; 9 per cent, $34.50; 10 per cent, $36.50; 11 per cent, $39.00; 12 per cent, $41.50.

Fluxes and Refractories

Fluorspar, 80 per cent and over calcium fluoride, not over 5 per cent silica, per net ton f.o.b. Illinois and Kentucky mines	$22.00
Fluorspar, 85 per cent and over calcium fluoride, not over 5 per cent silica, per net ton f.o.b. Illinois and Kentucky mines	23.50

Per 1000 f.o.b. works:

	High Duty	Moderate Duty
Fire Clay:		
Pennsylvania	$42.00 to $45.00	$37.00 to $42.00
Maryland	47.00	42.00
Ohio	42.00 to 43.00	37.00 to 39.00
Kentucky	42.00 to 43.00	37.00 to 39.00
Illinois	——	37.00 to 42.00
Missouri	42.00 to 45.00	35.00 to 40.00
Ground fire clay, per net ton		6.00 to 7.00
Silica Brick:		
Pennsylvania		42.00
Chicago		49.00
Birmingham		50.00
Ground silica clay, per net ton		8.00
Magnesite Brick:		
Standard size, per net ton (f.o.b. Baltimore and Chester, Pa.)		65.00
Grain magnesite, per net ton (f.o.b. Baltimore and Chester, Pa.)		40.00
Chrome Brick:		
Standard size, per net ton		48.00

Semi-Finished Steel, F.O.B. Pittsburgh or Youngstown, per gross ton

Rolling billets, 4-in. and over	$40.00
Rolling billets, 2-in. and under	40.00
Forging billets, ordinary carbons	45.00
Sheet bars, Bessemer	42.50
Sheet bars, open-hearth	42.50
Slabs	40.00
Wire rods, common soft, base, No. 5 to ¼-in.	51.00
Wire rods, common soft, coarser than ¼-in.	$2.50 over base
Wire rods, screw stock	$5.00 per ton over base
Wire rods, carbon 0.20 to 0.40	3.00 per ton over base
Wire rods, carbon 0.41 to 0.55	5.00 per ton over base
Wire rods, carbon 0.56 to 0.75	7.50 per ton over base
Wire rods, carbon over 0.75	10.00 per ton over base
Wire rods, acid	15.00 per ton over base
Skelp, grooved, per lb.	2.35c. to 2.40c.
Skelp, sheared, per lb.	2.35c. to 2.40c.
Skelp, universal, per lb.	2.35c. to 2.40c.

Finished Iron and Steel, F.O.B. Mill

Rails, heavy, per gross ton	$43.00
Rails, light, new steel, base, lb.	2.25c.
Rails, light, rerolled, base, per lb.	1.85c. to 2.00c.
Spikes, ⅝-in. and larger, base, per 100 lb.	$3.00 to $3.15
Spikes, ½-in. and smaller, base, per 100 lb.	3.15 to 3.25
Spikes, boat and barge, base, per 100 lb.	3.25 to 3.50
Track bolts, ⅝-in. and smaller, base, per 100 lb.	4.00 to 4.25
Track bolts, ¾-in. and larger, base, per 100 lb.	4.50 to 5.00
Tie plates, per 100 lb.	2.55 to 2.60
Angle bars, per 100 lb.	2.75
Bars, common iron, base, per lb., Chicago mill	2.40c.
Bars, common iron, Pittsburgh mill	2.40c.
Bars, rails, steel reinforcing, base, per lb.	2.15c. to 2.25c.
Cold finished steel bars, base, Chicago per lb.	3c.
Ground shafting, base, per lb.	3.40c.
Cut nails, base, per keg	$3.15 to $3.25

Alloy Steel

S.A.E. Series Numbers	Bars 100 lb.
2100*(1¼% Nickel, 10 to 20 per cent Carbon)	$3.50
2300 (3½% Nickel)	5.00 to 5.25
2500 (5% Nickel)	7.75 to 8.00
3100 (Nickel Chromium)	4.00 to 4.25
3200 (Nickel Chromium)	5.75 to 6.00
3300 (Nickel Chromium)	8.00 to 8.25
3400 (Nickel Chromium)	7.00 to 7.25
5100 (Chromium Steel)	3.75
5200*(Chromium Steel)	7.50 to 8.00
6100 (Chromium Vanadium bars)	4.75 to 5.00
6100 (Chromium Vanadium spring steel)	4.50 to 4.75
9250 (Silico Manganese spring steel)	3.75 to 4.00
Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chromium, 0.15 Vanadium)	5.00 to 5.25
Chromium Molybdenum bars (0.80—1.10 Chromium, 0.25—0.40 Molybdenum)	4.50 to 4.75
Chromium Molybdenum bars (0.50—0.70 Chromium, 0.15—0.25 Molybdenum)	4.25 to 4.50
Chromium Molybdenum spring steel (1—1.25 Chromium, 0.30—0.50 Molybdenum)	4.75 to 5.00

Above prices are for hot-rolled alloy steel bars, forging quality, per 100 lb., f.o.b. Pittsburgh. Billets 4 x 4 in. and larger are $10 per gross ton less than net ton price for bars of same analyses. On smaller than 4 x 4-in. billets the net ton bar price applies.

*Not S.A.E. specifications, but numbered by manufacturers to conform to S.A.E. system.

Freight Rates

All rail freight rates from Pittsburgh on finished iron and steel products, carload lots, 36,000 lb. minimum carload, per 100 lb.:

Philadelphia, domestic	$0.32	Buffalo	$0.265	St. Louis	$0.43	*Pacific Coast	$1.15
Philadelphia, export	0.235	Cleveland	0.215	Kansas City	0.735	*Pac. Coast, ship plates	1.20
Baltimore, domestic	0.31	Cleveland, Youngstown Comb.	0.19	Kansas City (pipe)	0.705	Birmingham	0.58
Baltimore, export	0.225	Detroit	0.29	St. Paul	0.60	Memphis	0.56
New York, domestic	0.34	Cincinnati	0.29	Omaha	0.735	Jacksonville, all rail	0.70
New York, export	0.255	Indianapolis	0.31	Omaha (pipe)	0.705	Jacksonville, rail and water	0.415
Boston, domestic	0.365	Chicago	0.34	Denver	1.26	New Orleans	0.67
Boston, export	0.255			†Denver (pipe)	1.17		

*Applies minimum carload 80,000 lb. †Minimum loading 46,000 lb.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 35c.; ship plates, 40c.; ingot and muck bars, structural steel, common wire products including cut or wire nails, spikes, and wire hoops, 40c.; sheets and tin plates, 40c.; sheets, No. 12 gage and lighter, 50c.; rods, 40c.; wire rope cables and strands, 45c.; wire fencing, netting and stretcher, 40c.; pipes not over 12 in. in diameter, 55c.; over 12 in. in diameter, 2½c. per in. or fraction thereof additional. All rates per 100 lb. in carload lots, minimum 36,000 lb.

FABRICATED STEEL BUSINESS

Awards Exceed 33,000 Tons and Fresh Projects Call for Upward of 25,000 Tons

The volume of fabricated steel bookings totals over 33,000 tons, of which about 9000 tons is for bridges, 4300 tons for schools and the remainder mostly for private enterprises. The largest single award, 6500 tons, is for a building for the Brotherhood of Locomotive Engineers, Cleveland. Pending projects call for more than 25,000 tons, the largest in several weeks. Awards include:

James Madison High School, New York, 3000 tons; general contract awarded to T. A. Clarke; steel probably to be fabricated by a leading independent steel company.

Bing & Bing, apartment building, West Forty-fifth Street, New York, 900 tons, to Taylor-Fichter Steel Construction Co.

Brotherhood of Locomotive Engineers, office building, Cleveland, 6500 tons, to Bethlehem Steel Co.

Bridge over Raritan River, Perth Amboy, N. J., 5000 tons, to Bethlehem Steel Co.

New York Central, reinforcing of sub-structure over tracks to sustain building to be erected at 277 Park Avenue, New York, 250 tons, to Belmont Iron Works.

Baltimore & Ohio Railroad, bridge at Parkersburg, W. Va., 2000 tons, to unnamed fabricator.

Mantaup Power Co., Fall River, Mass., power plant, 3000 tons, to American Bridge Co.

Shampan loft building, New York, 1500 tons, to Hedden Iron Construction Co.

Paragon loft building, New York, 600 tons, to Hinkle Iron Works.

Public School No. 121, New York, 1300 tons, to A. E. Norton, Inc.

Bohack bakery building, Brooklyn, 500 tons, to Hay Foundry & Iron Works.

Los Angeles Gas & Electric Corporation, Los Angeles, office building, 2298 tons, to American Bridge Co.

Great Northern Railroad, bridge work, 1683 tons to American Bridge Co.

Ford Motor Co., assembling plant, Kansas City, Mo., 1100 tons, to Mississippi Valley Structural Steel Co.

Illinois Bell Telephone Co., Chicago, Superior office, 740 tons, to Gage Structural Steel Co.

United States Government Bureau of Yards and Docks, store house, Pearl Harbor, H. I., 488 tons, to McClintic-Marshall Co.

Dells Paper & Pulp Co., 13 tainter gates and runway steel for dam, Eau Claire, Wis., 275 tons, to Wausau Bridge & Iron Works.

Madigan Brothers, Chicago, mercantile building, 201 tons, to Gage Structural Steel Co.

Sanitary Clay Products Co., Kokomo, Ind., plant addition, 250 tons, to Heatherington & Berner.

Missouri River Bridge, Mobridge, S. D., 1000 tons to Minneapolis Bridge Co. instead of to Minneapolis Steel & Machinery Co. as reported last week.

Third National Bank building, Dayton, Ohio, 1050 tons, to American Bridge Co.

M. Wile & Co., Buffalo, factory, 500 tons, Jones & Laughlin Steel Corporation low bidder.

Salvation Army Building, Pittsburgh, 500 tons, to Jones & Laughlin Steel Corporation.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

Macmillan Co., book publishing building, Fifth Avenue, New York, 1000 tons.

Fifth Avenue Coach Co., New York, addition to shops, 600 tons.

Office building, 208 West Thirtieth Street, New York, 500 tons.

French Institute in United States, building at Sixtieth Street, New York, about 600 tons.

Mechanics Bank, Brooklyn, about 150 tons.

Loft Building, 1 West Forty-seventh Street, New York, 1500 tons.

Office building, Times Square district, New York, 3000 tons.

Apartment building, Lexington Avenue and Thirty-sixth Street, New York, 500 tons. Also several other apartment buildings in various locations in New York totaling 2000 to 3000 tons or more.

Montgomery building, Spartanburg, S. C., 1000 tons.

Sea Gate Hotel, Coney Island, New York, 800 tons.

Orthopedic Hospital, East Fifty-eighth Street, New York, about 500 tons.

Crane Co., Chicago, foundry building, 7000 tons.

Great Northern Railroad, repairs to bridges Nos. 95 and 68, 950 tons.

Board of Trade building, Kansas City, Mo., 1200 tons.

Buick Motor Co. plant, location not given, 2560 tons.

Toledo Art Museum, Toledo, Ohio, 400 tons.

RAILROAD EQUIPMENT BUYING

Few Orders for Rolling Stock—Chesapeake & Ohio Withdraws Inquiry for 2000 Freight Cars

Only 1350 cars were ordered in the past week, and inquiries for domestic use total only 100 cars. The Indian State Railways are asking prices on 3000 small cars, but the business is expected to go to England. The interesting development of the week was the announcement of the Chesapeake & Ohio that it would not buy the 2000 freight cars it inquired for because of the high prices quoted on the specialties.

Locomotives in need of repair on Dec. 1 totaled 10,572, or 16.4 per cent of the total number active, according to the Car Service Division of the American Railway Association, a decrease of 224 compared with the number in need of repair on Nov. 15. Of the total number, 9755, or 14.9 per cent, were in need of heavy repair on Dec. 1, a decrease of 224 from Nov. 15.

The Chesapeake & Ohio Railroad has definitely withdrawn its inquiry for 2000 cars, giving as a reason the high prices quoted on the specialties.

The Indian State Railways, Simla, India, is inquiring in the United States for 3000 small cars of 16 types, requiring about 4 tons of steel to the car. Bids close Jan. 22, 1924. It is expected here that the business will go to British car builders.

The Great Northern Railway will rebuild 1000 box cars in its own shops and in the Siems-Stembel plant at St. Paul, Minn. The cars will be converted into stock cars.

The Atlanta & West Point Railroad is inquiring for 100 composite high-side gondolas of 50-ton capacity.

The Norfolk & Western Railroad has contracted with the Ralston Steel Car Co. and the Newport News Shipbuilding & Dry Dock Co. for the rebuilding of 1000 steel hopper cars.

The Chile Exploration Co., 120 Broadway, New York, is inquiring for a number of gondola ore cars, each 70 tons capacity.

The Interstate Public Service Co., Indianapolis, has ordered 3 sleeping cars, 2 dining cars, 2 express cars, 3 express trailers and 10 stock cars from the American Car & Foundry Co.

The St. Louis Southwestern has divided an order for 1000 box cars between the American Car & Foundry Co. and the Mt. Vernon Car Mfg. Co.

The Chicago & Alton has ordered 250 box cars from the Pullman Co.

The Southern Pacific is expected to close for 10,000 cars for its own lines and for the Pacific Fruit Express some time this week.

The Rapid Transit Subway Construction Co., New York, has placed 100 motor subway cars with the American Car & Foundry Co.

The Fruit Growers Express is inquiring for 1000 underframes.

The Central of Georgia is inquiring for 4 coaches, 2 baggage and mail cars and 3 baggage and express cars in addition to the 6 cars mentioned last week.

The St. Paul & Tacoma Lumber Co. placed 1 locomotive with the Baldwin Locomotive Works.

The Clemmins Logging Co. ordered 1 engine from the Baldwin Locomotive Works.

NON-FERROUS METALS

The Week's Prices

Cents per Pound for Early Delivery

	Copper, New York		Straits Tin	Lead		Zinc	
Dec.	Lake	Electrolytic*	New York	New York	St. Louis	New York	St. Louis
12.....	13.25	12.87½	47.75	7.62½	7.40	6.57½	6.22½
13.....	13.25	12.87½	47.95	7.65	7.50	6.55	6.20
14.....	13.25	12.87½	47.25	7.65	7.50	6.57½	6.22½
15.....	13.25	12.87½	....	7.75	7.60	6.55	6.20
17.....	13.25	12.87½	46.75	7.75	7.60	6.55	6.20
18.....	13.25	12.87½	47.25	7.75	7.60	6.55	6.20

*Refinery quotation; delivered price ¼c. higher.

New York

NEW YORK, Dec. 18.

Most of the markets are quiet as is usual toward the end of the year. The copper market is steady with demand fairly good. Buying of tin continues active. Lead on small transactions has advanced. Demand for zinc is light with the market slightly easier.

Copper.—Firmness continues to be the feature of the copper market with practically no change in price for the last three weeks. Some sellers insist that the tone is a little stronger this week, but electrolytic copper can still be bought at 13.12½c., delivered, as the minimum price, with some producers asking not less than 13.25c., delivered, all quotations pertaining to the first quarter. An explanation offered for the steadiness of the market is that there has been steady consumptive buying of moderate proportions since late in November and that there has been no necessity to advance or reduce prices, due either to a lack of demand or an unusual eagerness to buy. Foreign buying has also been satisfactory with France the chief purchaser. Lake copper is quoted at 13.25c., delivered.

Tin.—The week has been a fairly active one with total sales during the days covered by this report amounting to about 1000 tons. There were large sales the middle of last week, about 450 tons being sold on Dec. 12, with about 100 tons changing hands on Dec. 11, on which day more could have been sold had sellers not withdrawn. The market was exceedingly dull on Dec. 13 and quiet on Dec. 14, sales for the two days amounting to about 200 tons. On the latter day prompt tin sold at 47.12½c. to 47.25c., with futures at 47c. On Saturday and on Monday at least 150 tons were sold each day. Consumers have been the principal buyers in all these transactions and it is therefore presumed that they have comfortably covered their requirements for some little time to come. Spot Straits tin today is quoted in New York at 47.25c., New York, with the market only moderately active. London prices today were about £5 to £6 per ton higher than a week ago at £234 5s. for spot standard, £236 5s. for future standard and £236 5s. for spot Straits. Arrivals thus far this month have been 4190 tons with 4491 tons reported afloat.

Lead.—There is an entire absence of large transactions and the market is dominated by the sale of small lots at varying fancy prices, mostly for prompt delivery. Sales are reported anywhere from 7.50c. to 8c., New York, and 7.50c. to 7.75c., St. Louis. It is therefore difficult to quote a fair market price under such conditions. As near as can be gaged the New York outside market is close to 7.75c., with the St. Louis price around 7.60c. The leading interest still maintains a quotation of 7.25c., New York, and has done some business for future delivery at that level.

Zinc.—This market continues exceedingly quiet and slightly easier, with prime Western quoted at 6.20c., St. Louis, or 6.55c., New York, with a premium of about five points per month for future delivery. Neither galvanizers nor brass makers are buying liberally, but covering only their immediate needs. Some producers look forward with confidence to better conditions in January and feel that the market at present is close to the bottom.

Nickel.—Shot and ingot nickel are quoted unchanged at 29c. to 32c. per lb., with electrolytic nickel held at 32c. by the leading producers. Both shot and ingot nickel in the outside market are quoted at 29c. to 32c. per lb.

Antimony.—Wholesale lots of Chinese metal are higher at 9.25c. for prompt and 9c. per lb. for future delivery, duty paid, New York.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted by importers at 26c. to 26.50c., delivered, duty paid, with only a few importers able to do business. No quotations are available from the leading American producer.

Old Metals.—The market is quiet and values are unchanged. Dealers' selling prices are as follows:

	Cents per Lb.
Copper, heavy and crucible	12.75
Copper, heavy and wire	11.75
Copper, light and bottoms	10.00
Heavy machine composition	10.75
Brass, heavy	8.00
Brass, light	6.25
No. 1 red brass or composition turnings	9.00
No. 1 yellow rod brass turnings	7.00
Lead, heavy	6.75
Lead, tea	5.75
Zinc	5.00
Cast aluminum	17.50
Sheet aluminum	17.50

Chicago

CHICAGO, Dec. 18.—In a quiet market lead has advanced and the other metals remain unchanged. Among the old metals lead pipe has gone up. We quote in carload lots: Lake copper, 13.50c.; tin, 48c.; lead, 7.60c.; spelter, 6.30c.; antimony, 11c., in less than carload lots. On old metals we quote copper wire crucible shapes and copper clips, 10.50c.; copper bottoms, 9.50c.; red brass, 8.75c.; yellow brass, 6.75c.; lead pipe, 6c.; zinc, 4.25c.; pewter, No. 1, 25c.; tin foil, 32c.; block tin, 36c.; all buying prices for less than carload lots.

Furnace and Mill Operations in the Mahoning Valley

YOUNGSTOWN, Dec. 18.—The A. M. Byers Co., Pittsburgh, planned to blow in Dec. 20 Mattie blast furnace at its Girard plant, which has been idle for repairs and overhauling. The resumption of this stack and suspension by the Republic Iron & Steel Co. of a lapweld tube mill constitute the most important changes this week in operating schedules of Mahoning Valley iron and steel properties. The sheet mill plant of the Falcon Steel Co. at Niles is entirely idle.

Resumption of the Byers furnace brings the total in the Youngstown district to 19 active stacks, of 27.

Of the 17 tube mills in the Valley, 13 are active, the Sheet & Tube having three idle and the Republic company one.

The "D" blast furnace in the East Youngstown group of the Sheet & Tube company will be blown in as soon as work of rehabilitation is completed. The date of its resumption is still undetermined.

Of the 120 sheet and jobbing mills in the Mahoning Valley, 70 were scheduled on Monday, a gain of two as compared with the week before. The Sharon Steel Hoop Co. has all nine sheet mills at its Haselton plant scheduled this week.

Steel making schedules in the district continue with little change, 32 of the 51 independent open-hearth furnaces being active and all of the Bessemer plants.

All plate mills are suspended, while strip mill production is being maintained at 65 per cent.

The Falcon Tin Plate Co. is operating four mills at its Canton property, while the Trumbull Steel Co. has 30 tin mills active.

At the last meeting of the New England Foundrymen's Association, at Boston, the Peter F. Leonard Foundry Co., Salem, Mass., and the Carborundum Company, Boston, were made members of the association. E. H. Ballard, General Electric Co., Lynn, Mass.; E. M. Shaw, Walker, Pratt Co., Watertown, Mass., and H. E. Wetherbee, James Hunter Machine Co., North Adams, Mass., were made a nominating committee for officers to be balloted for at the annual meeting of the association next month. Charles A. Reed, Reed, Fears & Miller, Inc., Boston, will be in charge of arrangements.

PERSONAL

Charles L. Close, manager of the Bureau of Safety, Sanitation and Welfare, United States Steel Corporation, has returned to his office, 71 Broadway, New York, after an absence of four months. Following a major operation, Mr. Close went to Florida and is now entirely restored to health.

E. H. Haslam, Conway Building, Chicago, formerly vice-president of Mackintosh-Hemphill Co., Pittsburgh, and recently with the Steel & Tube Co. of America, Chicago, has been retained by Hadfields, Ltd., Sheffield, England, to assist in the development of the company's interests in the United States. Incidental to his duties in that connection he has been appointed president of the Hadfield-Penfield Steel Co.

William A. Baker, formerly in charge of the Detroit office of the Firestone Steel Products Co., has been appointed sales manager of the company.

John A. Oartel, safety director Carnegie Steel Co., Pittsburgh, spoke on "One Hundred Per Cent Safety in Industries and How to Get It" at the opening meeting, Dec. 14, of a series conducted by the Baltimore Safety Council, Baltimore. More than 800 superintendents, foremen and others representing Baltimore industries attended.

C. A. Smith, formerly in the Cleveland district office of the New Jersey Zinc Sales Co., has been transferred to the Pittsburgh office of the company. Before going to Cleveland Mr. Smith had been in the New York office.

R. L. Cain has been appointed superintendent of open-hearth furnaces at the Upson works, Borune-Fuller Co., Cleveland, succeeding W. C. Troupe who resigned a short time ago to become associated with the McFeely Brick Co., Pittsburgh.

F. S. Whitman, president Belvidere Screw & Machine Co., Belvidere, Ill., has resigned on account of ill health.

Carl A. Johnson, president Gisholt Machine Co., Madison, Wis., was re-elected president for a second time by the Wisconsin Manufacturers' Association at its annual meeting held in Milwaukee, Dec. 4-6. George L. Vits, general manager Aluminum Goods Mfg. Co., Manitowoc, was elected vice-president. George B. Ingersoll, vice-president and general manager Fairbanks, Morse & Co., Beloit, was re-elected treasurer. George F. Kull, Madison, is executive secretary and manager.

Harrison Boyce, inventor of the motor-meter, announces his retirement from active management of the Motor-Meter Co. in order to give more time to the promotion of boycite, a fuel ingredient produced by the Boyce & Veeder Co., Inc., Long Island City, N. Y. His former activities as general manager will be assumed by E. V. Hennecke, sales manager Motor-Meter Co. for the last five years.

Albert Ladd Colby, consulting engineer Bethlehem, Pa., sailed for Europe Dec. 12 on professional work which will require his absence until about April 1. His address while abroad will be care of the Iron and Steel Institute, 28 Victoria Street, S. W. 1, London, England.

Clinton G. Armstrong, formerly consulting metallurgist for the Chicago Flexible Co. and research metallurgist of the Western Electric Co., has joined the Calorizing Co., Pittsburgh, as sales engineer. He will be connected with the Chicago office.

A. T. B. Shiels has been appointed Northern Pacific Coast representative of the Bethlehem Shipbuilding Corporation, Ltd., succeeding Capt. J. F. Blain, resigned. Mr. Shiels will maintain the present offices at 422-23 Colman Building, Seattle, Wash.

J. B. Orbison, who has taken charge of the Springfield, Ohio, works, American Radiator Co., has made extensions and alterations to the plant by which capacity is doubled. He succeeds Henry Dyer, manager for the last ten years, who resigned to take up other work. Mr. Orbison says the works will be busy to the end of the year and that the outlook for next year is promising.

OBITUARY

Francis E. Myers

FRANCIS E. MYERS, head of the F. E. Myers & Brother Co., Ashland, Ohio, manufacturer of pumps, whose death was briefly recorded in THE IRON AGE of Dec. 6, was born in Perry Township, near Ashland, and his early days were spent on a small farm. When he was 23 years of age, he was employed as a farm machinery salesman. In 1875 he started a little implement shop, but later took a position as salesman with the Bucher & Gibbs Plow Co. and worked his way to the head of the company. During this time, his brother, P. A. Myers, had secured a patent on a double-acting force pump in the manufacture of which they joined hands. So remarkable was the growth of the enterprise that addition after addition was made to the plant which today employs several thousand men. Mr. Myers was an industrial engineer of high order and as sound in financial judgment as in plant management. Testimony to these qualities lies in the recollection that the company ran full force throughout the crisis of 1907. Yet with all these interests he gave freely of his time to public and civic affairs. He was at one time president of the Farm Equipment Manufacturers' Association, at the last meeting of which he was given life membership. He was also former president and builder of the Cleveland, Southwestern & Columbus Railway, one time director of the Aurora, Elgin & Chicago Railroad, of the Mansfield Traction Power & Light Co., and also of the Nickel Plate Railroad. He was a conspicuous figure in many other enterprises in and outside of Ashland. Mr. Myers was chairman of the Panama-Pacific Exposition Committee of Ohio. Among those surviving are three brothers: G. D. Myers, a director and general sales agent of the company; A. N. Myers, a director in charge of employment; Phillip A. Myers, also connected with the company; a son, John C. Myers, advertising manager, and several sisters and daughters.

WILLIAM A. ROOME, treasurer Chamberlin-Roome Steel Co., steel jobber, Chicago, died following a stroke of apoplexy, Dec. 12, aged 57. Prior to participating in the organization of the Chamberlin-Roome Steel Co., in 1921, Mr. Roome was for about ten years Chicago district sales representative of the Otis Steel Co., Cleveland. Before that he was identified with the sales organizations of Joseph T. Ryerson & Son and the Illinois Steel Co.

CHARLES H. POND, for 30 years president of the Scranton Forging Co., Scranton, Pa., died on Dec. 3.

STEPHEN C. MASON, secretary McConway & Torley Co., Pittsburgh, died at his home in that city, Dec. 12, following an illness of about a month. Mr. Mason was

born in Fairlee, Vt., 63 years ago and, before going to Pittsburgh in 1895 to become associated with the McConway & Torley Co., had been assistant statistician of the Interstate Commerce Commission in Washington for about 10 years. He became secretary of that company in 1899 and since had held that position. He was president of the National Association of Manufacturers from 1918 to 1921. He was a director of the Railway Business Association and a vice-president of the National Founders Association.

J. F. Morgan

J. F. MORGAN died at his home in Jackson, Ohio, Dec. 12, at the age of 81 years. Mr. Morgan was born in Cardingshire, Wales, June 9, 1842, and when six years old came with his parents to America, settling in the charcoal furnace district of Jackson County, where he grew to manhood. During the Civil War he served in the Union Army and was mustered out with his company at Nashville, Tenn., at the close of hostilities. A few years later he became identified with southern Ohio furnace interests, his first experience being with the Olive Furnace Co., operating a charcoal stack near Ironton, Ohio. Following this he went to Jackson, being connected with the operation of the Tropic stack, where the native stone coal was used almost exclusively for smelting purposes. He remained with that company until its dissolution, after which he went to Oak Hill, Ohio, to take charge of the Etna Fire Brick Co. It was while connected with the latter company that he became interested in the organization of the Jackson Iron & Steel Co. in 1906 and was finally persuaded to become active in the management of its affairs, returning to Jackson in 1909 as secretary and treasurer, in which capacity he served until his death.

The passing of Mr. Morgan takes from the active list the last of those pioneers of the furnace industry in southern Ohio who have seen the business grow from the old charcoal stack, making a few tons a day, up to its present advanced stage.

Sheet Sales Drop in November

PITTSBURGH, Dec. 18.—November sales of sheets by manufacturers reporting to the National Association of Sheet and Tin Plate Manufacturers fell approximately 20,000 tons behind those of October, and about 58,000 tons under the September record. Shipments fell 31,000 tons under those for October and there was a drop in production of 37,000 tons, compared with the previous month. Unfilled orders showed a decrease for November of about 27,000 tons. Net obligations of makers arrived at by deducting unshipped and unsold stocks from unfilled tonnage as of Nov. 30 were 167,828 tons. November figures in net tons compare with October and September as follows:

	November	October	September
Capacity	407,000	424,000	377,000
Per cent reporting	69.0	69.5	68.8
Sales	165,491	185,110	223,556
Production	188,144	225,714	185,577
Shipments	199,836	230,820	205,722
Unfilled tonnage	280,013	307,540	343,096
Unshipped stocks	66,624	71,902	84,338
Unsold stocks	45,561	34,982	29,975

Advisory Committee on Non-Ferrous Metals

The regular autumn meeting of the advisory committee on non-ferrous metals was held at the Bureau of Standards Nov. 16. The discussion covered tentative and proposed specifications for non-ferrous metals and alloys, new standard samples, the effect of impurities on the mechanical properties of bearing metals, corrosion of non-ferrous metals, electrodeposition, the effect on hardness of the cold rolling of metals, aluminum casting alloys, the fatigue resisting properties of duralumin, the work of the bureau on pure zinc in connection with the physical constants of metals, new refractories, molding sand research, tests on the tensile properties of non-ferrous alloys at elevated temperature, mercury vapor poisoning in research work, and possible applications of metal spraying.

DEMAND IMPROVING

President Campbell Gives His Views on Market Conditions

YOUNGSTOWN, Dec. 18.—At the annual meeting last week of sales representatives of the Youngstown Sheet & Tube Co., President James A. Campbell stated that improved demand is developing both in the East and in the Chicago district for the heavier steel products, such as plates and structural shapes.

Little or no improvement has yet materialized in the requirements for oil country pipe, though the demand for standard pipe is still holding firm. Mr. Campbell looks for better lapweld tube demand by next spring. He points out that oil production is still below demand due to the falling off of output in some of the important producing fields. This is a condition, he believes, which will shortly stimulate drilling, which will mean larger sales of lapweld sizes of tubes and other oil country pipe supplies.

Mr. Campbell still contends that finished steel prices are unlikely to go lower, pointing to the stability of prices in the semi-finished field, particularly in sheet bars. When consumers come to realize that prices are unlikely to further decline, he believes that buying will be resumed on a broader scale.

The Sheet & Tube company is preparing to enlarge its blast furnace operations, having accepted recently large orders for pig iron to be delivered from its stacks at Youngstown and in the Chicago district. Since Dec. 1, the company's stack at Indiana Harbor, acquired from the Steel & Tube Co. of America, has shown a daily production of 699 tons. The furnace was built about four years ago.

Automobile companies are pressing inquiries as to the ability of makers of full-finished sheet stock to supply their early 1924 requirements. District producers indicate that the 5.35c. base quotation, for No. 22 gage auto body stock, is firm and will be adhered to. There also appears to be less price cutting on the common sheet grades than formerly, although a number of the non-integrated rollers are still accepting tonnage under the market in order to keep their mills operating.

With operations at 65 per cent, the strip market is still in favor of the buyers and prices range from 2.75c. to 3c. on the standard gages. Cold strip is quotable from 4.75c. to 5c., some interests having gone below the market to obtain business.

The plate market is very inactive, but makers are holding to the 2.50c. base price.

Bookings of Steel Castings in November

WASHINGTON, Dec. 18.—The Department of Commerce announces that November bookings of steel castings, based on reports from principal manufacturers and representing over two-thirds of the commercial castings capacity of the United States amounted to 39,660 tons, as against 37,446 tons in October. The following table shows the bookings of commercial steel castings for the past eleven months by 65 identical companies, with a monthly capacity of 96,900 tons, of which 38,300 tons are usually devoted to railway specialties and 58,600 tons to miscellaneous castings.

	Total		Railroad Specialties		Miscellaneous Castings	
Month 1923	Net Tons	Per Cent of Capacity	Net Tons	Per Cent of Capacity	Net Tons	Per Cent of Capacity
January	100,605	103.8	47,879	125.0	52,726	90.0
February	90,152	93.0	39,845	104.0	50,307	85.8
March	143,564	148.2	76,409	199.5	67,155	114.6
April	90,968	93.9	39,610	103.4	51,358	87.6
May	89,493	92.4	38,788	101.3	50,705	86.5
June	84,878	87.6	42,773	111.7	42,105	71.9
July*	52,066	53.7	13,741	43.7	35,325	60.3
August	50,515	52.1	18,332	47.9	32,183	54.9
September	47,574	49.1	21,685	56.6	25,889	44.2
October	37,446	38.6	9,840	25.7	27,606	47.1
November	39,660	40.9	12,916	33.7	26,744	45.6

*Two companies with a capacity of 785 tons per month on miscellaneous castings now out of business.

Plans of New Companies

The Jordan Machine Tool Co., 249 Third Avenue, South, Minneapolis, Minn., has been incorporated with capital stock of $50,000 and will manufacture Jordan cylinder reboring and regrinding machines. Manufacturing will be done under contract, but no awards have yet been made. The company will also handle pistons, piston pins, rings and replacement parts necessary to this line. R. E. Nyberg, secretary-treasurer, is interested in hearing from companies equipped to manufacture its product.

Centrifugal Cast Iron Pipe Co., 15 Exchange Place, Jersey City, N. J., has been incorporated with capital stock of 300,000 shares no par value stock, to take over the assets and business of the original Centrifugal Cast Iron Pipe Co. The new company will continue the business along the same lines. Raymond Ritti is secretary.

The Southern Radio Corporation of Texas, 608 West Evergreen Street, San Antonio, Tex., has been organized with $35,000 capital stock to act as distributor in radio and electrical appliances. John C. Rodriguez is president; W. G. Egerton, vice-president, and Frank Kaymore, secretary-treasurer.

The Holtson Mfg. Corporation, 119 East York Street, Baltimore, recently organized, will manufacture oil burners and kindred products, and will do a general machine repair business, specializing in marine engines. It is in the market from time to time for iron castings, pressure tanks, iron pipes and fittings, also various parts for marine engines. W. B. Holtson is president.

The Lehigh Sewer Pipe & Tile Co., Ft. Dodge, Iowa, has been incorporated with $800,000 capital stock to manufacture sewer pipe, having taken over the business by that name established in 1907. No other changes have been made. Address in care of George W. Avery.

Stevens Duryea Motors, Inc., Chicopee Falls, Mass., recently organized to manufacture Stevens-Duryea cars, has plant and equipment for present needs and is making only slight purchases to complete inventory. Ralph R. Owen is president.

The Baker Mfg. Co., Hinton, W. Va., recently organized to manufacture mechanical products, will have manufacturing done under contract. Address in care of R. F. Dunlap.

The Dobbins Mfg. Co., 225 North New Jersey Street, Indianapolis, has been organized to manufacture automotive products. Work will be done by contract, awards having been let. The company operates an assembling plant. C. O. Dobbins is president and B. F. Rhodabarger, vice-president and general manager.

The New England Oil Burner Co., 20 Aborn Street, Providence, R. I., recently organized, will act as distributor of oil burners and kindred products. Willard W. Stearns is treasurer.

The Solar Mfg. Co., 403 Lafayette Square Building, Buffalo, has been organized to manufacture automotive products and specialties. No building is contemplated, all work being done by contract. J. P. Hearney heads the company.

The General Service Co., 707-8 Guaranty Trust Building, 606 Woodward Avenue, Detroit, has been organized to manufacture oil burners and equipment. Its products have been manufactured for several years in Canada, and work in this country will be done by an associated concern. George M. Seymour is general manager.

The Super-Ear Corporation, 41 Union Square, New York, has been incorporated with capital stock of $100,000, and is now making preparations to manufacture acoustic devices. Incorporators are: H. Shoen, I. Ross and L. S. Scher, the last name being head of the company.

The Williamsburg Electric Supply Co., 636 Broadway, Brooklyn, recently incorporated with $100,000 capital stock to manufacture and deal in electrical equipment, will confine activities to distribution. Incorporators are: J. A. Korn and M. A. and P. Cutler.

Veolayne, Inc., New York, has been incorporated with capital stock of $25,000 to manufacture wireless equipment and parts. Some manufacturing has been done, but negotiations have not yet been completed for producing on a larger scale. Temporary address is care of J. C. McDermott, 27 William Street.

The Steinmetz Radio Service Corporation, 458 Saratoga Avenue, Brooklyn, recently incorporated with nominal capital, will act as distributor of wireless products. No manufacturing is contemplated. Address care of A. H. Simon, 189 Montague Street, Brooklyn.

The Superb Auto Repairing Co., 54 Newlots Road, Brooklyn, recently incorporated with $10,000 capital stock, will operate a machine and repair shop. Plant and equipment have been provided. Incorporators are: L. Strauss, E. Lavender and M. Bradie.

The Holmes Vapor Carburetor Motor Corporation, New York, recently incorporated with $100,000 capital to manufacture automotive products, has interrupted negotiations, owing to the illness of one of the principals. It is unlikely that plans will be resumed until after the holidays. Edward Holmes, 255 West Forty-third Street, is head.

The Purco Steel Corporation, 127 Christopher Street, New York, has been incorporated with capital of 1,000 shares, no par value stock, to manufacture and deal in iron and steel products. Plans have not yet been completed. Incorporators are: J. S. and A. R. Purdy, and H. Deves.

The Wurldsbest Ventilator Co., 170 Fifth Avenue, New York, has been incorporated with capital stock of $150,000 to manufacture ventilators and ventilating equipment. Production is now handled by contract through the Automobile Sheet Metal Works, Richmond, Ind. The company expects to manufacture approximately 300,000 ventilators during the coming year. R. B. Respess heads the company.

The Backer Metal Specialties Corporation, 406 Broome Street, New York, has been incorporated with $50,000 capital stock to manufacture metal products, specializing in small domestic articles. Small quantities of brass and nickel are used. A. Backer, formerly vice-president, Pullman Metal Specialties Co., Forty-fourth Street and Tenth Avenue, is president of the company. Operations have been started.

The United States Radio Kraft Corporation, 132 Nassau Street, New York, has been organized with capital stock of $100,000 to manufacture wireless equipment. Although manufacturing may be undertaken later, present activities are devoted to acting as distributor for large manufacturers of radio equipment. Abraham Segall heads the company.

The Wheeler-Raisley Mfg. Co., 160-70 Mechanic Street, New Haven, Conn., incorporated with capital stock of $50,000, will manufacture stainless steel cutlery for the present and later may expand to include automobile equipment. It has leased 10,000 sq. ft. of floor space and has equipment to begin operations. Gardner E. Wheeler, general manager Wheeler Radiator & Mfg. Co., East Cleveland, Ohio, and for the last 15 years associated with the English & Mersick Co., New Haven, is president. John C. Raisley, formerly manager of the Hemming Brothers Mfg. Co., New Haven, is vice-president and secretary.

The Equipment Devices Co., care of the Corporation Trust Co. of America, Dupont Building, Wilmington, Del., has been organized with capital stock of $1,200,000 to manufacture devices. No equipment will be needed. The business is being financed privately.

The Eversharp Mfg. Co., New Brunswick, N. J., has been organized with $100,000 capital stock and is manufacturing horseshoes, calks and other steel specialties, particularly railroad equipment. Its factory, a new steel structure, is completely equipped for cold heading, heat treating and pressing. George F. McCormick is president-treasurer and B. J. Trumbull is vice-president and sales manager.

The International Derrick & Equipment Co., 186 East Broad Street, Columbus, Ohio, has been organized as a consolidation of the Columbus Structural Steel Co., the International Steel Products Co. and the International Derrick & Equipment Co. The new organization will manufacture and distribute oil, gas and artesian well drilling and pumping derricks and equipment. Harry M. Runkle is president.

The Wausau Motor Parts Co., Wausau, Wis. has been organized with capital stock of $50,000 to manufacture automotive parts and equipment. The company has been in operation for two years at Menominee, Mich., making piston rings. It recently moved its plant to Wausau. Additional equipment will be added gradually. E. N. Viele is general manager.

The Line Hardware Mfg. Co., 18222 Oakview Road, Cleveland, has been organized by J. D. Holt, formerly connected with the Electrical Materials Corporation, which is no longer in existence.

The Duty Air Brake Co., Harrisville, W. Va., has been organized with $20,000 capital stock to manufacture air brakes. So far manufacturing has been done by contract, but the company is open for bids on equipment. The management would like to hear from automobile manufacturers who are interested in the product. C. B. Lewis is general manager.

Scott Brothers, Inc., 1548 South Water Street, Philadelphia, has been incorporated with $100,000 capital stock, to manufacture auto truck equipment, but for the present will haul freight and other material in and near Philadelphia. J. W. Scott heads the company.

The R. B. Stoker Co., 57-61 Berriman Street, Brooklyn, has been incorporated with capital stock of $25,000 to manufacture roofing products. Its plans are not definitely decided, but if manufacturing is undertaken, it will likely be done by contract. M. B. Price, W. M. G. Watson, and H. St. George are the incorporators.

The King Lamp & Mfg. Co., Hudson Reed Building, New York, has been organized with $15,000 capital stock to manufacture electric lamps and devices. It will act as distributor for the time but may manufacture on a small scale in the remote future. Address in care of L. B. Brodsky, 299 Broadway, New York.

The Pinzet Co., Inc., New York, has been incorporated with $30,000 capital stock to manufacture machinery and parts, specializing in a machine for binding papers and pamphlets. Manufacturing will be done by contract. C. Aaron and H. A. Reiting are the incorporators. Address care of W. F. McCormack, 256 Broadway.

The New City Car Co., care of the Corporation Trust Co. of America, du Pont Building, Wilmington, Del., has been organized with capital stock of $10,000,000 to manufacture wheels. This is a close corporation and there will be no stocks nor securities offered for publice sale. Materials and equipment will be purchased from time to time, but trade relations have already been established.

Thomas J. Peterson, for the past 12 years connected with the Georgia Supply Co. as vice-president and manager of the Jacksonville branch, and W. W. Starr, formerly of the Manhattan Rubber Mfg. Co., are opening a wholesale mill supply house at 134 East Bay Street, Jacksonville, Fla.

The Beisel Spring Wheel Corporation, 49 West Sixty-fourth Street, New York, recently organized to manufacture a new type of steel wheel for automobiles and trucks, will contract work for the present on passenger car wheels. Eventually the company will operate its own plant and will add truck wheels, which employ good quantities of high grade steel. William J. Beisel is president.

The Hydraulic Transmission Corporation of America, 874 Broadway, New York, has been organized with nominal capital to manufacture a front wheel drive truck and also a hydraulic transmission. Negotiations for manufacturing have not been taken up, but it is likely that the company will lease a factory and do its own manufacturing. Trucks embodying these new features, are now on exhibition. John Keller is president and Hilaire J. Holder, formerly with the Chevrolet and Scripps-Booth companies, is general manager.

The H. C. Oswald Supply Co., 2360 Third Avenue, New York, has been incorporated with $50,000 capital stock to manufacture and deal in metal products but unless plans are changed, the company will act as distributor in these lines for the time being. H. C. Oswald heads the company.

The Allied Die Casting Corporation, Stillman Avenue, Honeywell and Buckley Streets, Queens, New York, has been incorporated with capital stock of $100,000 to manufacture die castings and light products. Operations have been started. Incorporators are E. H. Kelley, W. E. Johnston and G. W. Reynx.

The Karwill Specialty Co., 103 Park Avenue, New York, has been incorporated with capital of 1000 shares, no par value stock, to manufacture pipe and plumbing supplies, specializing in a new product which will be manufactured by an outside concern. N. G. Martin, B. H. Trask and E. H. Miller are the incorporators.

Trade Changes

H. F. Chase has been appointed by the American Nickel Corporation, Clearfield, Pa., manufacturer of malleable nickel and Mond nickel alloys, as representative in the New York district, with offices at 350 Madison Avenue.

The Walton & Macke Nail Co., Kokomo, Ind., leased its plant from Oct. 31, 1919 to Oct. 31, 1922, to a company which incorporated and operated as the Walton & Macke Nail Co., Inc. The latter company is now dissolving, but this action has no bearing on the original and present company, known as the Walton & Macke Nail Co., a partnership, which is still doing business in cement coated nails.

The Davis Boring Tool Co., Inc., 3718-24 Forest Park Boulevard, St. Louis, has construction well under way on a modern, fireproof factory, which will give approximately five times the present capacity.

The Midvale Co., Nicetown, Philadelphia, manufacturer of forgings, alloy steels, locomotive tires, etc., announces the opening of a sales office in Room 914, Union Trust Building, Pittsburgh, in charge of Harvey S. Garrett as district sales manager.

The Lake Superior Iron Ore Association has moved its offices from the Rockefeller Building to the new Union Trust Building, Cleveland.

The Isthmian Steamship Line, subsidiary of the United States Steel Corporation, has opened an office in the Union Trust Building, Cincinnati, with E. L. Kimes as manager. Mr. Kimes has been connected with the Cleveland office.

The Falstrom Co., Passaic, N. J., maker of sheet metal products, has opened a New York office at 198 Broadway, in charge of A. B. Jonas.

The Townsend Co., maker of rivets, wire nails and wire, New Brighton, Pa., has moved its Chicago office to Room 721 London Guarantee and Accident Building, 360 North Michigan Avenue. D. C. Noggle, sales manager of the Indianapolis branch, has moved his office to 618-19 Fletcher Savings & Trust Building.

The Kearns-Dughie Motors Corporation, manufacturer of motor trucks, Danville, Pa., has purchased all assets of the Belmont Motors Corporation, Lewistown, Pa. With the 70,000 sq. ft. of floor space, production will be considerably increased. Manufacturing will be done at Lewistown and the Danville plant will be used as the sales and service branch.

The Bethlehem Shipbuilding Corporation, Ltd., announces the removal of its San Francisco sales offices to 1000 Matson Building, 215 Market Street.

The J. C. Smith Hoe & Tool Co., Evansville, Ind., has changed the name to the Young Car Co. and expects to manufacture bodies for commercial auto trucks in addition to the mine cars, hoes and tools it has been making for several years. John F. Young is president.

J. E. Rhoads & Sons, makers of leather belting and lace leather, has moved its central office from 12 North Third Street to 35 North Sixth Street, Philadelphia.

By an arrangement made between the Diamond Chain & Mfg. Co., Indianapolis, and the Chain Belt Co., Milwaukee, the latter will represent the Diamond company through newly established branches on the Pacific Coast. Both companies were previously represented in the territory by Meese & Gottfried, San Francisco. The new Chain Belt Co. offices are at 67-69 First Street, Portland, Ore., and 1040 Sixth Avenue South, Seattle, Wash.

The Whitney Mfg. Co., Hartford, Conn., has appointed the Pittsburgh Gear & Machine Co., Twenty-seventh and Smallman Street, Pittsburgh, as distributor in that district for the Whitney roller chain and silent chain.

The Chicago Pneumatic Tool Co., New York, announces the General Machinery Co., Spokane, Wash., as agent in the eastern part of Washington and northern Idaho.

The H. B. Wilson Co., St. Louis, composed of H. B. Wilson and J. M. Shea, who have represented the Mahr Mfg. Co., in that city for the last two years, has been given additional territory extending along lines of various railroads running out of St. Louis and taking in Kansas City.

The Building Products Co. has purchased the good will and patents of the Hodges adjustable shores, made in Cincinnati, and has purchased a plant in Toledo, Ohio, to manufacture them. The Building Products Co. has specialized on concrete form construction work. The property of the Milmine Iron & Steel Works at Toledo, including 1½ acres of land with modern buildings and machinery and sidings from both the New York Central and Clover Leaf railroads, has been purchased as the new home of Hodges shores. The Hodges shore was developed by Jesse E. Hodges, formerly general superintendent Ferro Construction Co., Cincinnati. It has been on the market for eight years. The Milmine plant will be the new home also of Blaw-Knox steel floor pans.

Directors of the Scoville Mfg. Co., Waterburg, Conn., have proposed the purchase of the American Pin Co. and the Oakville Mfg. Co. in notices sent to stockholders. Both the Pin company and the Oakville company are located in Waterbury and are capitalized at $1,350,000 and $600,000, respectively. The proposal would authorize issuance of $2,700,000 additional stock and $300,000 debentures.

Burton E. Carpenter, 1065 Columbia Avenue, Chicago, has been appointed mid-western representative of the Garvin Machine Co., New York.

William J. Breen is representing H. H. Adams & Co., New York, pig iron, coke, in New England.

The Frank B. Pope Co., refractories dealer, has moved from 2223 Oliver Building, Pittsburgh, to room 1511 of the same building.

The Townsend Co., manufacturer of rivets, wire nails and wire, New Brighton, Pa., will move its Chicago offices to Room 721, London Guarantee & Accident Building, 360 North Michigan Avenue, effective Dec. 15.

The Anodion Metal Co., Guilford Avenue and Oliver Street, Baltimore, manufacturer of lighting fixtures, etc., has changed its name to the Anodion Mfg. Co. C. W. Harvey is manager.

The Globe Iron-Crush & Shot Co., Mansfield, Ohio, has changed its name to the Globe Steel Abrasive Co.

Machinery Markets and News of the Works

INQUIRY BY RAILROADS

Southern Issues List of 210 Items—Baltimore & Ohio Also in Market

Scattering Railroad Orders in Past Week, But Buying by Industrial Companies Is Light

If present indications may be taken at their face value, there will be considerable buying of machine tools by some of the railroads soon after Jan. 1, or possibly before. The outstanding development is an inquiry from the purchasing department of the Southern Railway at Washington for 210 items, including a large number of pneumatic riveting hammers. The Baltimore & Ohio Railroad has also come into the market for quite a number of tools.

Miscellaneous orders have been placed by a number of roads, including the New York Central, which has begun covering on its recent inquiries. The Norfolk & Western is expected to place orders this week. The Santa Fe is preparing a list to be issued soon, covering a large amount of equipment, machine tools and cranes, for its shops at San Bernardino, Cal. The Union Pacific list, it is predicted, will be closed some time this month.

Automobile manufacturers, who have been active buyers throughout the year, are doing very little this month, but more inquiry from this source is expected next month. The Eaton Axle & Spring Co., Cleveland, is in the market for 10 machines. The Studebaker Corporation at Detroit bought four turret lathes.

Machine tool requirements for the new switchboard plant of the General Electric Co. at Philadelphia will probably be decided upon soon, in view of the fact that orders for 14 electric cranes for the buildings have just been placed with four crane builders.

New York

NEW YORK, Dec. 18.

ALTHOUGH orders of machine tools from industrial plants continue to come to local machinery dealers in mere driblets, prospects for a resumption of buying after the first of the year appear somewhat brighter. Promises of railroad buying after Jan. 1 also seem more definite. Some in the New York trade are quoting on the large list of the Southern Railway published in this issue under the Philadelphia heading and also on tools required by the Baltimore & Ohio. The New York Central has begun to place orders against its recent inquiries. Among the tools bought the past week were an axle lathe, a 36-in. x 16-ft. engine lathe and a 19-in. engine lathe. The Kansas City Southern has bought from an Eastern company a 12-ft. plate-flanging clamp and a 400-ton car-wheel press and the Pennsylvania Railroad bought from the same company a horizontal cotter and keyseating drill. Other orders placed in this market include a 14-ft. plate-bending roll for the Lombard Iron Works & Supply Co., Augusta, Ga.; a 1500-lb. steam hammer for the Carnegie Steel Co., Pittsburgh; a 5-ft. radial drill for the West Leechburg Steel Co., Pittsburgh, and a side-head boring mill for the Whitney Mfg. Co., Hartford, Conn.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until Dec. 28 for two fuel oil heaters and spare parts for the Brooklyn Navy Yard, schedule 1678; until Jan. 8 for 120 pressure switches for the same yard, schedule 1695.

The Cuba Cane Sugar Corporation, 123 Front Street, New York, has plans for a new refinery at Velasco, Cuba, and will commence work at an early date. A portion of the machinery now at the company mills at Centrals Feliz, Socorro and Lequeitio, Cuba, will be removed to the new plant, and additional equipment installed.

Grim & Cummings, 57 Frost Street, Brooklyn, laundry machinery and parts, plan for the installation of a lathe, milling machine and kindred equipment.

The Bureau of Foreign and Domestic Commerce, Washington, has information regarding a company in Brazil which proposes to build a cold storage plant to cost about $200,000, intending to use American machinery. Reference No. 113282.

The Centennial Paper Mills, Inc., Valatie, N. Y., is planning the installation of power plant equipment, including a 200 kw. generator, direct-connected to steam turbine engine, with switchboard and auxiliary equipment.

Walter C. Talbot and Mortimer Brockway, Beacon, N. Y., have acquired the local plant and site of 160 acres of the Verplanck Brick Co., including waterfront and dock on the Hudson River. The new owners will install additional power equipment, conveying machinery, mechanical drying equipment, etc., to expand and modernize the plant.

The Belgian Government is taking bids until early in February for the construction of a new drydock, with operating machinery, to cost about $1,000,000, and solicits bids from American companies. Plans and specifications on file at three district offices of the Bureau of Foreign and Domestic Commerce, 734 Custom House, New York; 930 Witherspoon Building, Philadelphia, and 1801 Custom House, Boston.

Elevating, conveying and other material-handling machinery will be installed in the ten-story warehouse, 100 x 121 ft., to be erected on the Eastern Parkway, Brooklyn, by the St. Mark's Holding Corporation, 1043 Pacific Avenue, to cost about $700,000. Charles B. Meyers, 31 Union Square, New York, is architect.

The American Locomotive Co., 30 Church Street, New York, has plans for a one-story shop at Schenectady, N. Y., to cost $100,000 with equipment.

The Harrison Box Co., Harrison Place and Varick Street, Brooklyn, is taking bids on a general contract for a two-story addition, 100 x 150 ft., to cost about $45,000, with machinery. McCarthy & Kelly, 159 Remsen Street, architects.

The Board of Albany County Superivsors, Albany, N. Y., will purchase in the near future one 10-ton caterpillar type tractor and four 5-ton tractor machines. J. J. McNulty is chairman.

The Industrial Machinery Division, Bureau of Foreign and Domestic Commerce, Washington, room 815, will receive catalogs and literature of brick-manufacturing machinery, transmission and power equipment for brick plants, with capacity from 5000 to 30,000 brick per day, for reforwarding to Consul A. T. Haeberle, Sao Paulo, Brazil, where a market exists for American machinery of this kind.

Bids will be received by C. S. White, purchasing agent, New York Central Railroad, Room 344, 466 Lexington Avenue, New York, until Dec. 28 for wire nails, staples, steel tubes, axles, cast iron wheels, and other equipment, to be covered by serial contract No. 34-1923.

Van Zandt, Inc., River and Rensselaer Streets, Troy, N. Y., will install a coal conveyor, with elevating equipment, at the power house at its shirt factory, with capacity of about 3 tons per hr., elevating height, 18 ft.

Bids will be received by the secretary, Public Works Tenders Board, Wellington, New Zealand, until April 30 for the construction of power plant, known as Section 2, Arapuni Electric Power Scheme, as per plans and specifications on application.

An electric power plant will be erected by the Distinctive Pictures Corporation, 366 Madison Avenue, New York, Arthur S. Friend, president, at its proposed studio plant in Queens Borough, to cost more than $250,000. William O. Hurst is company architect.

The E. W. Bliss Co., Inc., Brooklyn, has disposed of another portion of its former plant at Plymouth and Pearl

Streets, 125 x 143 ft., to John J. Heitler, who will have plans drawn for a two-story automobile service and repair building to occupy the entire site.

The Sociedade de Usinas Siderurgicas, city of Santa Barbara, state of Minas Geraes, Brazil, has plans for the construction of an iron and steel plant, including foundry, machine shops, general iron works and other buildings. A blast furnace is also projected.

Manual training equipment will be installed in the high school to be erected at Fort Edward, N. Y., estimated to cost $250,000, for which plans are being drawn by Loth & White, 190 State Street, Albany, N. Y., architects.

The Standard Oil Co. of New Jersey, 26 Broadway, New York, will construct a large storage and distributing plant, with pipe line, pumping station, etc., in the vicinity of Cacalilac, Mexico, to handle the output of the Mexican Seaboard Oil Co., Cacalilac, for which a contract recently was made. It will cost more than $200,000, with equipment.

The Tidewater Oil Co., 11 Broadway, New York, will commence the erection of a storage and distributing plant at 83-101 East Peddie Street, Newark, consisting of five buildings and pumping plant, to cost $170,000, with equipment. A service and repair building for company motor trucks will be included, costing $50,000.

Bids will be received by the Board of Education, Department of Supplies, City Hall, Newark, until Dec. 27 for sheet metal shop machinery, pumps and valve reseating equipment, electrical equipment and other apparatus. R. D. Argue, secretary.

L. Bamberger & Co., 147 Market Street, Newark, department store, are having plans drawn for a five-story service, operating and storage building, for company automobiles and motor trucks, and other equipment, to cost about $1,000,000. Abbott, Merkt & Co., 175 Fifth Avenue, New York, architects and engineers.

The F. E. O. Corporation, 67 William Street, East Orange, N. J., Frank P. Oexle, general manager, will take bids at once on a general contract for a two-story automobile service and repair building, 59 x 250 ft., at Spring Avenue and North Willow Street, Montclair, N. J., to cost about $130,000.

The Town Council, Hammonton, N. J., plans the installation of two electrically-operated pumps and auxiliary machinery at the municipal pumping plant, including air compressors and machinery for converting the station from steam to electric operation. Town Engineer Baker in charge.

Fire, Dec. 8, destroyed a portion of the pipe fitting plant of the American Copper Products Corporation, Bayway, Elizabeth, N. J., with loss estimated at $30,000. It is planned to rebuild.

Manual training equipment will be installed in the proposed senior high school to be erected at Maplewood, N. J., estimated to cost $500,000, for which plans will be drawn at an early date. Henry W. Foster is superintendent of schools, in charge.

The New Jersey Power & Light Co., 30 West Blackwell Street, Dover, N. J., is perfecting plans for extensions in generating plants and system and the installation of additional machinery. A block of preferred stock is being sold to finance the work.

The Pyrene Mfg. Co., 520 Belmont Avenue, Newark, manufacturer of fire extinguishers, has plans for a one-story plant, 100 x 310 ft., at 109-13 Meeker Avenue, to cost $65,000.

The Albert Pipe Supply Co., Berry and North Thirteenth Streets, Brooklyn, is in the market for a three-phase, motor connected friction saw and also a large pipe threading machine, standard makes only.

Buffalo

BUFFALO, Dec. 17.

PLANS are being perfected by the Board of Education, Buffalo, for a new vocational school in the Kensington district, to cost about $550,000. Ernest C. Hartwell, superintendent of education, in charge.

The Mohawk Paper Makers, Inc., Cohoes, N. Y., will commence the erection of a one-story power plant, 47 x 90 ft., to cost $100,000 with equipment.

The Elba Cold Storage Co., Elba, N. Y., recently organized, care of C. K. Porter & Sons, 73 West Eagle Street, Buffalo, architects, will take bids for a two-story cold storage and refrigerating plant, 100 x 140 ft., to cost $125,000, with equipment.

The Rochester Gas & Electric Corporation, Rochester, N. Y., is disposing of a bond issue of $4,000,000, a portion of the proceeds to be used for extensions and equipment. Robert M. Searle, president.

The Board of Contract and Supply, Syracuse, N. Y., will purchase lathes and other mechanical equipment for local schools. F. E. Barry, secretary.

Fire, Dec. 10, destroyed a portion of the machine shop at the plant of the General Electric Co., River Road, Buffalo, with loss of about $20,000. It is planned to rebuild.

The Truck Equipment Co., 1791 Fillmore Avenue, Buffalo, manufacturer of motor truck equipment, has plans for a one-story addition to cost $21,000.

The Rochester Packing Co., 900 Maple Street, Rochester, N. Y., will install an ice and refrigerating plant at its new five-story factory, 200 x 300 ft., to be erected on Exchange Street, Albany, N. Y., estimated to cost $500,000. Henschein & McLaren, 1637 Prairie Avenue, Chicago, are architects.

The Binghamton Light, Heat & Power Co., Binghamton, N. Y., is disposing of a block of mortgage bonds, the proceeds to be used in part for extensions.

J. H. Knobloch, 79 Tamarack Street, Buffalo, is planning to purchase presses and other equipment for the manufacture of cement and concrete blocks.

A manual training department will be installed in the two-story high and grade school to be erected at Sodus, N. Y., estimated to cost $175,000, for which bids are being asked on a general contract. Max Umbrecht, Fayette Park Building, Syracuse, N. Y., architect.

The Cutler Ice Co., 310 Front Street, Binghamton, N. Y., will commence erection of a new ice-manufacturing plant to cost $50,000.

Fire, Dec. 13, destroyed the engine department and portion of main plant of the Ellicottville Novelty Co., Ellicottville, N. Y., manufacturer of turned wood specialties, with loss estimated at $50,000 including machinery. It is planned to rebuild.

The Common Council, Gouverneur, N. Y., is perfecting plans for a municipal electric power plant to cost $60,000. L. Reynolds, Geneva, N. Y., is engineer.

The Home Refrigerating Co., Watertown, N. Y., affiliated with the Northern Utilities Corporation, same city, plans the installation of machinery. J. N. Carlisle, head.

The Parker Rust Proof Co. of Buffalo, Inc., 11 Cleveland Place, Buffalo, has been organized with $18,000 capital stock and will establish a plant to rust-proof iron and steel by the Parker process. The company has purchased rights to the process for western New York. Sand blasting and chemical apparatus will be purchased. R. C. George is president.

The Otis Elevator Co., Buffalo, has bought a 3-ton Moore electric furnace for installation at its Buffalo works to replace two other electric furnaces. This furnace will be installed with acid bottom for foundry operation.

Philadelphia

PHILADELPHIA, Dec. 17.

THE Southern Railway, through its purchasing department in Washington, has issued an inquiry for 210 items of shop equipment, of which 157 are pneumatic riveting hammers and the remainder are mostly machine tools of various types. The Baltimore & Ohio Railroad is also in the market for a number of tools for its shops at Glenwood and Montclair, Md.

The list of the Southern Railway is given below. All of the machines unless otherwise specified are to be motor driven, 220 volt, three phase, 60 cycle.

One double-head axle lathe to take 6 x 11 in. axles.
One car-wheel turning lathe for 42-in. wheels.
One steel car-wheel turning lathe for turning wheels up to 42 in. diameter.
One 18-in. tool room lathe.
Four 16-in. portable bolt lathes.
One 20-in. engine lathe, 12-ft. bed.
One 36-in. engine lathe to take 8 ft. between centers.
One 36-in. engine lathe, 12-ft. bed or not less than 6 ft. between centers.
One 24-in. heavy-duty lathe, 8 ft. between centers.
One 3 x 36 in. steel-head turret lathe with locomotive attachments.
One 90-in. driving wheel lathe with quartering attachment.
One 42-in. vertical boring mill with two heads on cross rail.
One 42-in. turret and side-head boring mill with table chuck.
One No. 3 universal milling machine.
One 15-ft. planer to plane sheets to 1 in. thickness.
One 42 x 42 in. x 14 ft. planer with two heads on cross rail.
One planer and matcher for car flooring, roofing and lining.
One 4-side timber planer for car sills to plane 12 x 18 in.
One 5-spindle wood borer.
One car timber planer.
One 32-in. heavy-duty shaper.
Two heavy-duty, draw-cut shapers for driving box work.

One 48-in. car-wheel press, 400 ton.
Two automatic radial stay threading and turning machines.
One staybolt threading machine.
One 26-in. slotting machine.
One 24-in. vertical turret lathe.
Two 2-in. double-head bolt cutters.
One 2-in. bolt heading and forging machine.
One flanging machine for flanging plates up to ¾ in. thick.
One pneumatic air and steam hose mounting machine.
One 4-in. pipe cutting machine, belt drive.
Two electric flue welding machines.
One 200 amp. electric welding machine, 440 volt, three phase, 60 cycle.
One 200 amp. electric welding machine, 220 volt, three phase, 60 cycle.
Two Modern twist drill grinding machines, capacity up to 2½ in. diameter drills.
Forty No. 60 pneumatic riveting hammers.
Forty-seven No. 80 pneumatic riveting hammers.
Seventy No. 90 pneumatic riveting hammers.
Three Sundstrand heavy-duty internal surface grinders.
One 48-in. throat motor-driven punch, capacity 1½-in. hole in 1¼-in. plate.
One 48-in. throat motor-driven shear, capacity equal to 1½-in. hole in 1¼-in. plate.
One pneumatic flue welding hammer and dies for superheater flues.
One flue welding furnace for superheater flues.
Two 24-in. wheel emery grinders, belt drive.
One 200 hp. water tube boiler to be erected by manufacturer.

The Metropolitan Edison Co., 16 South Fifth Street, Reading, Pa., through its management engineers, W. S. Barstow & Co., New York, announces a program of expansion of physical properties of its subsidiary companies contemplating ultimate expenditure of $20,000,000. There is now under construction at Middletown, Pa., on the Susquehanna River, a base load generating station costing $4,000,000; construction work has also been started on a plant of equal capacity on the Delaware River, eight miles below Easton, Pa. The Metropolitan Edison Co. controls the Metropolitan Electric Co. of Reading, the Edison Electric Illuminating Co. of Lebanon, the Lebanon Valley Electric Co., the Pennsylvania Edison Co., the York Haven Water & Power Co. and several others, all of which have been welded into a single system.

The Goshen Furnace Corporation, 1607 Real Estate Trust Building, Philadelphia, is in the market for a second-hand vertical tubular boiler, 54-in. diameter, not over 6 ft. high; capacity 100 lb. steam pressure.

A building permit has been issued to the General Electric Co., Schenectady, N. Y., for the second unit of its new plant at Sixty-eighth Street and Elmwood Avenue, Philadelphia, one-story, 119 x 254 ft., to cost $300,000, with equipment, for which a general contract has been let to the White Construction Co., Inc., New York. Harris & Richards, Drexel Building, architects.

Packard, Inc., 319 North Broad Street, Philadelphia, has taken title to property, 200 x 207 ft., at North Broad Street and Allegheny Avenue, as site for a four-story automobile service and repair building, to cost $900,000 with equipment. Philip S. Tyre, 1509 Arch Street, architect. Robert B. Parker, president.

Work will commence on a five-story automobile service and repair building at 2221-25 North Broad Street, Philadelphia, to cost $190,000, for which the owner's name will be announced at a later date. G. V. Warren, 1913 Arch Street, architect, in charge.

A one-story power house, 30 x 40 ft., will be erected at the plant of the Wilmington Bleachery Co., Market and Race Streets, Wilmington, Del., at Holmesburg, Philadelphia, the entire project to cost $130,000.

The Atlas Ball Bearing Co., Third Street and Glenwood Avenue, Philadelphia, will rebuild its power house and install additional equipment, partially destroyed by fire recently.

Frank W. Harper, head of the F. W. Harper Co., Hunt Building, Trenton, N. J., building materials, is completing negotiations for the purchase of the plant and equipment of the Trent Brick Co., for $50,500. The works will be remodeled and additional machinery installed. Robert A. Messler is receiver.

Fire, Dec. 10, destroyed a portion of No. 5 shop at the plant of the Stanley G. Flagg Co., Stowe, manufacturer of iron and steel castings, with loss estimated at $21,000. It is planned to rebuild. Headquarters are at 1421 Chestnut Street, Philadelphia.

Manual training equipment will be installed in the new Southern junior high school to be erected at Tenth and Chestnut Streets, Reading, Pa., estimated to cost $1,000,000. Edward Z. Scholl, 136 Robeson Street, architect.

C. A. McClure and George W. Crowley, Jr., care of James Collins Jones, Bullitt Building, Philadelphia, representative, are organizing the Williamsburg, Three Springs, Saltillo and Saxton Power companies, to install plants and systems in the localities for which named.

Fire, Dec. 10, destroyed the Tip Top coal breaker and equipment of the Beaver Valley Coal Co., Hazleton, Pa., with loss estimated at $50,000. Rebuilding plans are being considered.

The H. Geisel Co., Sellersville, Pa., is planning for a new factory at Perkasie, Pa., for the manufacture of cutlery, estimated to cost $27,000.

The Hamilton Watch Co., Lancaster, Pa., has plans for an addition, including improvements in present plant, estimated to cost $20,000. Equipment will be installed for an additional output of about 450 watches daily.

The Easton Gas Co., Easton, Pa., will make extensions and improvements, including a new holder at Raspberry and Franklin Streets, and installation of additional generating and other equipment, to cost $1,500,000.

The Vallamont Planing Mill Co., 1009 Market Street, Williamsport, Pa., plans for a new three-story factory 120 x 160 ft., to cost about $155,000, including the installation of electrically-operated machinery and power equipment. J. C. Wilson, head.

The Hillside Coal Co., Pittston, Pa., has plans for a new coal breaker to cost about $80,000 with machinery.

The Lackawanna Laundry Co., 308-12 Penn Avenue, Scranton, Pa., will install power equipment, conveying and other machinery at its proposed addition estimated to cost $100,000. A. B. Warman, head.

The Anthracite Chain & Engineering Co., Hazleton, Pa., recently organized with a capital of $50,000, is perfecting plans for works to manufacture mechanical chains and conveyor equipment invented by S. J. Benner, one of the heads of the company. E. D. Snyder and J. H. Lahm, Hazleton, are also interested.

John S. Fisher and A. J. Musser, officials of the Juniata Public Service Co., Juniata, Pa., are organizing two subsidiaries, the Mifflin and the Berrysburg Electric Service companies, to install plants and systems in Mifflin Township and Berrysburg Borough.

The Ocean City Gaslight Co., Ocean City, N. J., has arranged an appropriation of $100,000, for extensions in its plant, including new generating and purifying equipment, for capacity of 1,500,000 cu. ft. per day. Work will commence on a new 500,000 cu. ft. gas holder.

Fire, Dec. 8, destroyed a portion of the plant of the Ayers Machine Co., Salem, N. J., manufacturer of canning machinery, and practically destroyed the factory of the J. B. Campbell Mfg. Co., manufacturer of linoleum, etc., adjoining, with combined loss estimated at $160,000, including equipment.

Chicago

CHICAGO, Dec. 17.

WITH inquiries more numerous and store trade more active, local machine tool dealers look forward to a busy January. Bookings so far this month have been better than expected, in view of the fact that December is ordinarily dull because of inventory-taking and holiday activities. The Pettibone-Mulliken Co. has purchased two horizontal boring mills in addition to the machines mentioned in this column last week. The Sullivan Machinery Co., Michigan City, Ind., is placing orders for considerable equipment, having purchased two radial drills, a turret lathe, two horizontal boring mills, several engine lathes and a number of other machines.

Interest continues to center in railroad buying. The Union Pacific has issued an inquiry for a centering machine in addition to the tools mentioned last week, and is expected to close against its list, involving about $50,000, before the end of the year. It has already purchased a hydraulic combination mounting and demounting wheel press. The Burlington has placed orders for two 54-in. vertical boring mills, two pattern makers' lathes, and two used guide bar grinders. Its purchases against its recent list, the bulk of which was placed some weeks ago, now aggregate approximately $200,000. The Santa Fe is expected to issue an extensive list shortly, covering cranes and machine tools for the extension of its San Bernardino, Cal., shop. It has just asked for figures on a 100-in. Niles, or equivalent, double wheel quartering machine. The Kansas City Southern has purchased a motor-driven 18-in. engine lathe, and the Denver & Salt Lake has placed an order for an hydraulic bushing press.

The Crane Market

While there continues to be a general disposition to delay purchases until after Jan. 1, particularly on locomotive and small capacity overhead cranes, a few awards are noted this week. Among current inquiries is one from the General Electric Co., which has closed on its list of 14 cranes for Philadelphia, calling for two 100-ton, 75-ft. span, 4-motor overhead cranes with 25-ton auxiliaries, for Pittsfield, Mass. Stone & Webster, Boston, have not yet closed on the 25-ton overhead crane for Providence, R. I., inquiry for which recently appeared. The Southern California Edison Co. has purchased a 40-ton, 37-ft. span and a 15-ton, 37-ft. span, overhead cranes and the Norfolk & Western Railroad has placed a 10-ton 23-ft. span crane. A number of overhead cranes and a locomotive crane were sold last week at the public auction of the Isaac G. Johnson & Co. plant, Spuyten Duyvil, New York.

Among recent purchases are:

General Electric Co., Schenectady, N. Y., nine 3-ton overhead traveling cranes from the Northern Engineering Works; two 10-ton overhead cranes from Alfred Box & Co.; two 5-ton overhead cranes from the Chesapeake Iron Works and a 25-ton overhead crane from the Niles-Bement-Pond Co., all for installation at Philadelphia.

J. Schadel & Co., iron and steel scrap, Springfield, Ohio, a 25-ton, locomotive crane with generator and magnet for a new yard at Portsmouth, Ohio, from the Browning Co.

Vanadium Alloy Steel Co., Latrobe, Pa., a 5-ton, 80-ft. span, magnet handling crane from the Milwaukee Electric Crane & Mfg. Co.

Sandusky Cement Co., Cleveland, a 7½-ton, 80-ft. span, bucket handling crane, from the Milwaukee Electric Crane & Mfg. Co.

McKay Machine Co., Youngstown, Ohio, a 7½-ton, 37-ft. span, 3-motor crane from the Northern Engineering Works.

Atlantic Refining Co., Franklin, Pa., a 5-ton, 43-ft. span crane from the Northern Engineering Works.

Guibert Steel Co., Pittsburgh, a 5-ton, 50-ft. 5-in. span, 3-motor inclosed yard crane from the Northern Engineering Works.

Western Gas Construction Co., Fort Wayne, Ind., a 5-ton electric traveling crane from the Niles-Bement-Pond Co.

Thomas L. Green Co., Indianapolis, a 5-ton, 48-ft. 6-in. span, 3-motor, overhead traveling crane from the Milwaukee Electric Crane & Mfg. Co.

Northwestern Pacific Railroad, San Francisco, a 15-ton electric traveling crane from the Whiting Corporation.

Southern Wheel Co., Birmingham, Ala., seven 1½-ton jib cranes from the Whiting Corporation.

Pere Marquette Railroad, Detroit, eight jib cranes of 1 to 6 tons, from the Whiting Corporation.

Holden Co., Ltd., Montreal, a 150-ton, 100-ft. boom, 16-wheel, used Brownhoist locomotive crane for 24-gage track, from Philip T. King, New York.

The Whiting Corporation, Harvey, Ill., has taken the following orders for foundry equipment: No. 7 cupola for the Birmingham Stove & Range Co., Birmingham, No. 7 cupola for the Essex Foundry Co., Newark, N. J., and No. 6 cupola for the Saco-Lowell Shops, Boston.

Bradford Foote, until recently a member of the firm of Foote Brothers Gear & Machine Co., Chicago, who purchased the Crofoot Gear Works, Cambridge, Mass., for removal to Chicago, has bought the plant of the Acme Corporation at the corner of Oakley and Austin Avenues, Chicago. The Acme Corporation will move Feb. 1, to a new plant on Lake Street, near Forty-second Avenue, Chicago.

The William E. Pratt Mfg. Co., 190 North State Street, Chicago, recently incorporated with $50,000 capital stock, is a continuation of a company of the same name, not incorporated, which was established in 1893. The company has a malleable iron foundry at Joliet, Ill., occupying eight acres and employing 800 men. The plant, which has a yearly capacity of 12,000 tons, does a jobbing business. The company also conducts a jobbing machine shop and a hardware manufacturing business, its products including hog rings, wire belt fasteners, husking pins, farming tool brackets, clamps, clevises and other specialties. Officers are William E. Pratt, president; F. T. Radecke, vice-president, and A. F. Boehm, secretary and treasurer. No purchases of additional equipment are contemplated at this time.

A. T. Kincaid & Co., 321 East Monroe Street, Springfield, Ill., recently incorporated with $25,000 capital stock, will engage in the furnace and the heating appliance business, but will not do any manufacturing at present. Offices and warehouse are at the address given. Officers have not yet been elected.

Jaeger & Co., Inc., 122 West Kinzie Street, Chicago, recently organized with $50,000 capital stock, will confine its activities almost exclusively to the merchandising of bakers' supplies, and will manufacture only a few of these articles. Hans Jaeger is manager.

A. W. Cash Valve Mfg. Corporation, 250 East Wood Street, Decatur, Ill., recently incorporated with $10,000 capital stock, has established a shop at the address given and will manufacture pressure reducing and regulating valves, relief valves, ammonia expansion valves, pump governors, etc. It also expects to do some jobbing work. Officers are A. W. Cash, president, and George B. Madden, secretary and treasurer. No additional equipment will be bought at this time.

Michael Reif, 1340 George Street, Chicago, has let contract for a one-story tin shop, 28 x 101 ft., at 2049 Belmont Avenue, to cost $10,000.

The machine shop of the Aluminum Casting Mfg. Co., Davenport, Iowa, recently destroyed by fire, will be replaced by a brick structure as soon as insurance claims are adjusted. The machine shop was the only portion of the plant affected, and production is continuing as usual in the foundry.

The Iowa Malleable Iron Co., Ninth and Kirkwood Streets, Fairfield, Iowa, has plans for two one-story additions to its foundry, 100 x 140 ft., and 100 x 125 ft., to cost approximately $100,000. Bids will be asked on general contract in about 90 days. A. A. Wickland & Co., Inc., 5 South Wabash Avenue, Chicago, is engineer. W. W. Hughes is secretary and general manager.

The Globe Portland Cement Co., 416 McKnight Building, Minneapolis, Minn., has plans for its proposed works at Dubuque, Iowa, estimated to cost $2,000,000 with machinery. The Charles L. Pillsbury Co., 1200 Second Avenue, South, Minneapolis, is architect and engineer.

The Common Council, Bedford, Iowa, is having plans prepared for a municipal electric plant to cost about $65,000. The Prince-Nixon Engineering Co., Peters Trust Building, Omaha, Neb., is engineer.

The Common Council, Winthrop, Minn., is considering the erection of a municipal electric power plant, to cost $100,000 with machinery. August Malm is clerk.

Manual training equipment will be installed in the high school to be erected at Gordon, Neb., estimated to cost $110,000, for which bids will be called on a general contract early in February. F. B. Watson, Norfolk, Neb., is architect.

The United Light & Railways Co., Davenport, Iowa, is disposing of a bond issue of $1,000,000, a portion of the proceeds to be used for plant and system extensions. Frank T. Hulswit is president.

The C. D. Edwards Mfg. Co., Albert Lea, Minn., manufacturer of road machinery, has plans for a one-story addition to cost about $55,000. Gaarder & Gaarder, Home Investment Building, are architects.

New England

BOSTON, Dec. 17.

BUYING of machine tools in this market the past week was better than in the previous week, but was confined to comparatively little equipment and a few dealers. The New York, New Haven & Hartford Railroad purchased two new Warner & Swasey machines, a No. 2A and a No. 3A, which represents the first interest shown in shop equipment by any New England railroad in a long time. The Saco-Lowell Shops, Boston, textile machinery, is negotiating for Warner & Swasey lathes for its Lowell shops, but has under consideration a plan for revamping similar tools now in use at that plant. That company has, however, purchased Cincinnati milling machines and Monarch geared head lathes, as well as grinding tools and hack saws, but has not covered its equipment requirements. A South Boston shop purchased a used milling machine and press, and a local manufacturer grinding machines. Dealers are fairly well occupied on prospects that give every promise of closing shortly after Jan. 1.

Local machine tool houses will close Dec. 22 and not resume business until Dec. 26.

Bids are in on a proposed one-story, 120 x 170 ft. plant for the National Can Co., 36 North Washington Street, Boston, to be erected at Dorchester. Krokyn & Brown, 7 State Street, Boston, are the architects.

Griffith, Kiever & Co., 118 Western Ave., Brighton, Boston, builders finish, have awarded contract for a one-story, 100 x 160 ft. plant. Motors, belting, etc., will be required. Plans are private.

The Whittenton Mfg. Co., 437 Whittenton Street, Taunton, Mass., cotton goods, has foundations in for a two-story and basement, 70 x 77 ft. addition. Cole, Osgood & Kimball, 220 Devonshire Street, Boston, are the engineers. Motors will be installed to drive looms.

Bids are being taken for a sub-station addition on Glenville Terminal, Allston, Boston, and a sub-station at Dedham, Mass., to be erected by the Edison Electric Illuminating Co., 39 Boylston Street, Boston. Bigelow & Wadsworth, 120 Tremont Street, Boston, are the architects.

Plans are being considered by the Continental Wood Screw Co., Inc., Mount Pleasant Street, New Bedford, Mass., for a two-story addition, 40 x 100 ft., to cost $50,000.

A building permit has been issued to the Safety Car Heating & Lighting Co., Dixwell Avenue, Hampden, Conn., for a two-story addition to cost $40,000.

The Davol Rubber Co., Point Street, Providence, R. I., will commence the construction of a new plant on Smith Street, to cost $100,000 with equipment.

The Worcester Machinery Co., 140 Commercial Street, Worcester, Mass., plans the purchase of a pipe threading and cutting machine, to handle stock 8 in. and larger.

The East Millinocket Light Co., Millinocket, Me., has acquired the plant and property of the Millinocket Light Co., for $106,000. Plans are under way for extensions and additional equipment.

Fire, Dec. 6, destroyed a portion of the hydrate lime plant and machinery of the Lee Lime Co., Lee, Mass., with loss estimated at $50,000. It is planned to rebuild.

J. A. Glass, 27 Purchase Street, Boston, operating a metal works, plans the installation of a combination punch and shear.

The Pierce-Arrow Motor Car Co., Buffalo, has leased property at Boston for a factory branch and service works for its motor truck division.

The New York, New Haven & Hartford Railroad Co., New Haven, Conn., will commence the erection of a power house and oil storage plant at East Hartford, Conn., to cost about $50,000.

The Bureau of Supplies and Accounts, Navy Department, Washington, will take bids until Jan. 8 for 50 crucibles for the Portsmouth Navy Yard, schedule 1704; until Dec. 28 for 30,000 ft. pneumatic hose for the Boston yard, schedule 1703.

The Penn Metal Co., Boston, has purchased the machinery and equipment of the Dexter Metal Mfg. Co., Philadelphia, manufacturer of steel shelving, metal lockers and steel equipment. Additions are being made to the Penn company's factory and the Dexter equipment will be installed shortly after Jan. 1. The Dexter Metal Mfg. Co. will be exclusive sales agent for the steel shelving and lockers manufactured by the Penn Metal Co. C. Joseph Dexter becomes a director and vice-president of the latter company and George Sagendorph, president Penn Metal Co. an officer of the Dexter Metal Mfg. Co.

Detroit

DETROIT, Dec. 17.

THE Detroit Motor Bus Co., Edlie Street, Detroit, is having plans prepared for a one and two-story service and repair shop, with pumping plant and power department, estimated to cost $300,000. The Austin Co., 208 South La Salle Street, Chicago, is architect.

The Thwaite Furniture Co., Grand Rapids, Mich., is arranging for the purchase of the former plant of the National Spring & Wire Co., Albion, Mich., for a new factory. It will be remodeled and machinery installed, estimated to cost $50,000.

The Brown-Hutchinson Iron Works, 7807 Morrow Street, Detroit, has taken out a building permit for a one-story addition, estimated to cost $34,000, including equipment.

The White Motor Products Co., 215 South Leavitt Street, Chicago, L. T. Jamme, president and general manager, plans for new works at Muskegon Heights, Mich., remodeling and extending an existing building, estimated to cost $60,000.

The Consumers Power Co., Jackson, Mich., will build a new dam on the Manistee River, near its present Junction dam, and install additional machinery at its hydroelectric generating stations in this section.

The Capitol Brass Works, 2306 Franklin Street, Detroit, has filed plans for a four-story addition, estimated to cost $35,000, including machinery, for which a general contract has been let to Harry M. Frier, Penobscot Building.

The Reo Motor Car Co., Lansing, Mich., will build an addition to its power house, to include the installation of 1000 hp. boilers and other equipment.

The Michigan Central Railroad Co., Lansing, Mich., has tentative plans for a new engine house and repair shop at North Lansing, with initial capacity of about 10 locomotives at one time.

The Aladdin Motion Picture Camera Co., Detroit, now being organized, plans the establishment of a factory to manufacture a motion picture camera and machinery, to sell at a popular price. Precision and other equipment will be installed. David A. Brown, A. W. Ehrman, are heads. Hamlin, Kay & Nathan, Penobscot Building, stock brokers, are interested in the new company.

The Automotive Parts Co., Detroit, with branch works at Grand Rapids, Mich., and Toledo, Ohio, has been acquired by George W. Borg, head of the Borg & Beck Co., 6150 Second Street, operating an automobile parts business. Plans for extensions are under consideration.

The Graham Brothers Co., Evansville, Ind., manufacturer of motor trucks, has taken over the former plant of the King Motor Car Co., Conant Road, Detroit, which has removed its works to Detroit, as well as the new Detroit plant of the Denby Motor Truck Co., of that city, but never occupied. The acquisitions will increase the plant area of the purchasing company about three times; the former King plant will be equipped for assembling truck chassis, while the Denby structure for the time being will be used for storage and paint service.

Fire recently damaged the plant and office of the Cadillac Iron Works, Cadillac, Mich. The company manufactures brick presses, wire wheels and shock absorbers, besides doing a general jobbing machine shop business.

The U. G. Body Co., River Street, Lansing, Mich., is installing new equipment for wood and steel working in connection with the building, repair and remodeling of automotive bodies.

The American Vehicle Corporation, 6553 Woodward Avenue, Detroit, incorporated with capital stock of $10,000, will manufacture toy wagons with all-steel under works. It is in the market for disk wheels and drop forged steering knuckles, which may be replaced by malleable castings. The company is open to contract for these and will operate an assembling plant. Initial capacity will be 500 wagons per day. Lewis C. McSouth is vice-president.

Pittsburgh

PITTSBURGH, Dec. 17.

IF inquiries terminate into orders, the machine tool trade will have a very busy period after the first of the year. Furthermore, current business is good for this season. The Railway Steel Spring Co., which is building a new plant at Latrobe, Pa., to which the business in Pittsburgh will be removed, has bought a number of tools, including two board drop hammers and a trimming press, and another order running into a fair-sized amount of money was for a pipe machine, two lathes and a drill press from the Stevens-Wood Engineering Co., Youngstown. The Standard Sanitary Mfg. Co., will probably place the tools for its new plant in Baltimore before Christmas, so that work can be pushed on the foundations.

The Pennsylvania Railroad has issued a revised list of 18 tools for its new repair shop at Sharpsburg, Pa. The trade, in addition, has a number of single tools to figure on and there is a very hopeful feeling about early 1924 business.

A number of the steel companies are considering plans for new mill installations, the Republic Iron & Steel Co., being a probable buyer of a new continuous bar mill, with a 13,000 hp. steam engine drive.

Bids will be received by the City Controller, City-County Building, Pittsburgh, until Dec. 24, for one portable gasoline engine-driven air compressor, for the Bureau of Water. John P. M. Murphy, director.

The Municipal Service Co., Titusville, Pa., has acquired the plant and property of the Titusville Electric Light & Power Co. Plans are under way for extensions and the installation of additional equipment.

The Method of Tapping Large Size Holes In Pipe By Hand Machines Is Frequently Long and Tedious, In Many Cases Taking Four Men About Five Hours to Tap a 4-In. Hole in a Cast Iron Main. A gas company in Greater New York using the machine shown herewith claims that it permits of drilling, reaming and tapping a 3-in. hole in 10 min. and a 4-in. hole in 15 to 18 min. This apparatus, which is known as the Boyd pipe tapping machine and is manufactured by the Silent-Hoist Co., Brooklyn, N. Y., may be driven by an air motor, using an ordinary air drill on the drive shaft as shown, or by electric motor or gasoline engine, in connection with a flexible coupling shaft. The machine is arranged with automatic feed but may also be fed by hand as shown for drilling. Employed as a hand machine, instead of having a direct application of the ratchet to the tap as usual, a gear reduction is used to increase the power applied

The Bessemer Motor Truck Co., Grove City, Pa., recently merged with the American Motors Co., Plainfield, N. J., to form the Amalgamated Motors Corporation, is arranging to discontinue operations at its local plant and will complete shipments of machinery to the Plainfield works during January. A machine and repair plant will be maintained at Grove City for at least twelve months, with all manufacturing concentrated at Plainfield. The Amalgamated company recently added the Krebs Motor Truck Co., to its consolidation, headed by J. C. L. Krebs, formerly connected with the Clydesdale Motor Truck Co., Clyde, Ohio.

The Penn Public Service Corporation, Johnstown, Pa., has closed negotiations for the purchase of the Corry Electric Light Co., Corry, Pa., and will take possession in January. Extensions are planned, including additional equipment.

The Chambersburg Ice & Cold Storage Co., Martinsburg, W. Va., plans a two-story addition, estimated to cost $70,000 with equipment.

The Wheeling Glass Mfg. Co., Wheeling, W. Va., has acquired the plant of the North Wheeling Glass Co., and will take immediate possession. It is planned to remodel and install power and other equipment to give employment to about 500 operatives.

The Laurel Run Coal Co., Shinnston, W. Va., recently formed with capital of $250,000, plans the installation of electric power equipment and mining machinery in the Laurel Run section. Thomas H. Laulis, Shinnston; and Charles E. Pitter, Fairmount, W. Va., are heads.

The Monongahela-West Penn Public Service Co., Fairmont, W. Va., plans extensions in its power plant and system in the Upper Monongahela Valley section. A portion of a stock issue of $1,000,000, soon to be sold, will be used for the work and purchase of equipment. George M. Alexander is president.

The Clarksburg Glass Co., Clarksburg, W. Va., will remodel its plant and install machinery to replace present hand operation, including electric power equipment. Eight sheet glass machines, and auxiliary apparatus, will be provided, with increase in working force to 250 operatives.

The Clarksburg Wholesale Co., Clarksburg, W. Va., recently formed by a consolidation of local interests, with capital of $500,000, has tentative plans for an ice and cold storage plant, estimated to cost $85,000. W. I. Booth is president, and C. P. Hood, secretary.

The Pennsylvania Railroad Co., Broad Street Station, Philadelphia, has plans for extensions in its ore docks at Erie, Pa., including the installation of cranes, conveying and other handling machinery, estimated to cost $500,000. The capacity will be doubled.

F. A. Scott, Fairmont, W. Va., and associates, have acquired the Stone Lick Coal Co., Weston, W. Va., and plan the installation of electric power and mining machinery.

The Sullivan Pocahontas Coal Co., Tralee, W. Va., recently organized to consolidate the Raleigh, Fire Creek, Wood Sullivan, Mead Pocahontas and other coal companies in this section, has tentative plans for expansion and the installation of electric power and other mining machinery. J. C. Sullivan is head.

St. Louis

St. Louis, Dec. 17.

BONDS for $500,000 have been approved by the Board of Public Service, St. Louis, for a city power plant, for which plans will soon be drawn.

The Common Council, Ava, Mo., plans the installation of electric pumping machinery at the municipal waterworks to cost $35,000.

The Jessner Welding Co., 202 West Third Street, Pittsburg, Kan., plans the installation of electric grinding equipment. O. F. Jessner is head.

The Oklahoma Gas & Electric Co., Oklahoma City, Okla., is disposing of a bond issue of $2,500,000, a portion of the proceeds to be used for extensions and additional equipment. J. J. O'Brien is vice-president.

The Mathews Motor Co., 301 North Pine Street, Pittsburg, Kan., plans the purchase of an electric drill, cylinder grinding, and other machines. C. S. Mathews is head.

The Common Council, Olathe, Kan., is planning for the installation of electric pumping machinery at the waterworks. The E. T. Archer Engineering Co., New England Building, Kansas City, Mo., is engineer.

The C. C. Utility Co., Eureka, Ark., has acquired the plant and property of the Harrison Electric Co., Harrison, Ark. Plans are projected for extensions, with additional machinery, and construction of new ice and cold storage plant estimated to cost $150,000.

The Davis Boring Tool Co., 3710 Forest Park Boulevard, St. Louis, has contracted with the Forest Spring Real Estate Co., St. Louis, for a new two-story plant, 75 x 180 ft., to cost $50,000. It will be occupied under lease. C. G. Schorieh, Syndicate Trust Building, is general contractor.

W. D. Beard, Ponca City, Okla., and associates are arranging for a new local ice-manufacturing plant to cost approximately $75,000. A plant, now in operation, will be continued.

A bond issue of $100,000 has been approved at Hannibal, Mo., for the installation of additional waterworks equipment, including pumps, motors and auxiliary machinery. D. H. Maury, 304 South Dearborn Street, Chicago, is engineer.

The Kansas City Cold Storage & Warehouse Co., Kansas City, Mo., is perfecting plans for a new eight-story plant estimated to cost $1,250,000, with ice-making, cold storage and other equipment.

The N. O. Nelson Mfg. Co., Tenth and Chestnut Streets, St. Louis, manufacturer of pipe, plumbing equipment, etc., has awarded a general contract to the Herman & McCain Construction Co., Riegler Building, for its factory branch at Little Rock, Ark., to cost $100,000.

The Common Council, Russell, Kan., plans the installation of electric pumping machinery at its proposed municipal

waterworks, estimated to cost $95,000, for which bonds have been approved. J. W. Murphy is clerk.

The Diamond Wood Heel & Mfg. Co., 407 South Broadway, St. Louis, will install electric-operated machinery and transmission equipment at its proposed two-story and basement plant at 3500 South Broadway, 75 x 170 ft., to cost $70,000. E. J. Hess, 3228 Magnolia Avenue, is architect.

W. A. Stevens, Quapaw, Okla., is planning to purchase a lathe, bandsaw, universal saw, transmission equipment and other machinery for a proposed woodworking plant.

The Mendenhahl Motor Co., 2317 Locust Street, St. Louis, is taking bids on a general contract for a four-story service and repair building, 38 x 155 ft., estimated to cost $150,000 W. P. McMahon, Title Guaranty Building, is architect.

The Pat-C Auto Signal Mfg. Co., 1823 Main Street, Joplin, Mo., plans the installation of a lathe, metal sanding machine and other equipment.

The Walter A. Zelnicker Supply Co., St. Louis, is inquiring for a jaw crusher, 36 x 48 in. or larger.

Cincinnati

CINCINNATI, Dec. 17.

MACHINE tool buying is light, but inquiries show no indication of letting up. While a fair number of orders are being booked, tools under negotiation give promise of some very active business shortly after the first of the year. Dealers report a fair volume of orders for small tools, while used machinery sales are light, which is usual at this season.

Railroad inquiries and buying are fairly active. The Norfolk & Western is expected to place orders this week and the Union Pacific list will probably be closed this month. The Pennsylvania Railroad, Central Region, has added two lathes to its inquiries, and the Boston Elevated Railway is in the market for two lathes. The Detroit United Railways is taking bids on one turret lathe.

Reorganization of the Monitor Stove & Range Co., Cincinnati, is expected to be completed before Jan. 1. The plant is now being operated under a receivership, but this will be lifted, new capital put into the company and a new board of directors elected.

The Cincinnati Advertising Products Co., Cincinnati, has awarded contract for two additional stories to its plant at 1101 York Street, to cost with equipment about $25,000.

The National Marking Machine Co., Spring Grove Avenue, Cincinnati, has purchased the plant of the Lunken Window Co., in Cumminsville, for expansion. The company will not immediately occupy the new plant.

The National Refrigolier Sales Co., Greenville, Ohio, recently incorporated with a capitalization of $50,000, is contemplating the manufacture of refrigerators, ice boxes and cabinets, but nothing definite has been decided. L. E. Kerlin, is the company's attorney.

The Reed Auto Equipment Co., Middletown, Ohio, has been incorporated with a capitalization of $25,000 to take over the business of the Reed Mfg. Co., manufacturer of shock absorbers. The company will continue to manufacture this product, but later expects to add other lines. E. O. Reed is president.

The W. B. Oglesby Paper Co., Middletown, Ohio, has plans for a two-story addition at its Sorg-Oglesby mills, 100 x 100 ft., to cost about $90,000. Thomas G. Scott & Sons, Middletown, are architects. L. C. Anderson, vice-president.

The John Steptoe Co., 2951 Colerain Avenue, Cincinnati, is in the market for a used gear hobber for gears up to 24 in. in diameter, also a bevel gear cutter.

M. H. Crump., P. O. Box 525, Bowling Green, Ky., is in the market for machinery for local asphalt properties, including crushing and conveying equipment, electric power plant machinery, steam power equipment, belting, transmission equipment, steam shovel, and auxiliary equipment.

Bids will be received by the Highway Iron Products Co., Columbia Building, Louisville, manufacturer of corrugated culverts and other iron products, until Dec. 27 for erection of its proposed one-story plant at Magnolia and Seventeenth Streets, to cost $105,000. The present business at Ligonier, Ind., will be removed to this location and additional machinery installed. Joseph & Joseph, Francis Building, are architects. Charles L. Watson, vice-president.

The interests of R. R. Rabe and Clifford Friar in the Rabe Pipe & Foundry Co., Chattanooga, Tenn., are said to have been acquired by Frank Gebbie and associates. The new owners propose to reorganize the company and extend the foundry.

The Louisville & Nashville Railroad Co., Louisville, will take bids on general contract until Dec. 31 for a one-story machine shop at Etowah, Tenn., 110 x 175 ft., estimated to cost $65,000. W. H. Courtenay, chief engineer, in charge.

Indiana

INDIANAPOLIS, Dec. 17.

BIDS will be asked early in January by the H. T. Electric Co., 612 North Capitol Avenue, Indianapolis, manufacturer of electrical equipment, for a new plant to cost $30,000 Edward D. Pierre, Hume-Mansur Building, is architect.

R. B. White, Anderson, Ind., and associates have organized a company to acquire the plant of the Anderson Foundry & Machine Co., now in receivership. Winfield T. Durbin, receiver, has been instructed by the court to receive sealed bids for the property, and sell for not less than $616,000, or amount of invoice of assets.

The Bucyrus Co., Evansville, Ind., manufacturer of dredging machinery, etc., is perfecting plans for an addition to its plant. Headquarters of the company are at South Milwaukee, Wis.

John Cook & Co., Indianapolis, manufacturers of aluminum ware, will remove their plant to larger quarters at 1717 Gent Street, where additional equipment will be installed.

The Board of Public Works, Anderson, Ind., is planning the installation of additional equipment at the city power plant, including a 5000 kw. turbine-generator set.

Manual training equipment will be installed in the new junior high school to be erected at East Chicago, Ind., Todd Park section, estimated to cost $400,000, for which bids will be asked on a general contract early in January. K. D. Norris, Calumet Building, is architect.

The Terre Haute, Indianapolis & Eastern Traction Co., Terre Haute, Ind., will soon take bids for the erection of new shops and car barns estimated to cost $50,000.

The National Terminals Corporation, Pennsylvania and Georgia Streets, Indianapolis, recently organized with assets of about $12,000,000 to consolidate the Indiana Refrigerating Co., Indiana Terminal Warehouse Co., and other interests, is formulating plans for a series of cold storage plants and terminals in Toledo and Columbus, Ohio; Philadelphia, Pittsburgh and Buffalo. Each plant will cost $1,000,000 with machinery, including material-handling equipment in the warehouse section. William J. Hogan is president and treasurer, and Norman E. Metzger, vice-president and secretary.

Cleveland

CLEVELAND, Dec. 17.

WHILE business in machine tools is dull, the volume is about as good as usual at this time of the year. The only new inquiry of any size is for 10 machines for the Eaton Axle & Spring Co., Cleveland. Inquiry for single machines is fair but prospective purchasers are slow in placing orders. Nothing is pending at present from the machine automobile companies except a few scattering tools. A local manufacturer of turret lathes the past week took four machines for the Detroit plant of the Studebaker Corporation, two for the New Haven Railroad and three for a Cincinnati brass working plant.

A fair volume of inquiry is coming out for heavy handling equipment. Two ore bridges, one in the Chicago and one in the Buffalo district, are being figured on, as well as some dock handling equipment, and an Eastern railroad has an inquiry out for six locomotive cranes. The McMyler Interstate Co., Bedford, Ohio, has taken a 175,000 lb. pile driver for a Western railroad.

The Horsburgh & Scott Co., Cleveland, manufacturer of gears, has commenced the erection of a three-story concrete building, 120 x 140 ft. for plant and office purposes.

The City Ice & Fuel Co., Cleveland, has taken bids for rebuilding its ice manufacturing plant at East 102nd Street and Elk Avenue. The capacity will be increased from 80 to 150 tons a day and the steam plant will be electrified.

The Kenton Wood Produce Co., Kenton, Ohio, will erect a saw mill and is in the market for two 10-hp. and one 50-hp 220 volt a. c. 60-cycle motor, a self-feeding rip saw, hack saw and derrick type of hoist.

The Great Lakes Refining Co., Toledo, Ohio, will shortly begin the erection of an oil refinery at an estimated cost of $150,000.

The Acme Ornamental Iron Works, Youngstown, Ohio, plans the erection of a one-story factory, 60 x 100 ft. In equipment it will require motors, punching and shearing machinery, grinders, drilling machines, lathes and power saws.

The plant formerly occupied by the Elyria Steel Products Co., Elyria, Ohio, has been purchased by the Premier Refining & Mfg. Co.

The American Electric Switch Co. recently organized, which purchased the plant of the Lewis Electric Co. in Minerva, Ohio, has elected E. F. Duquette, president; Charles P. Wolfe, vice-president and general manager and C. B. Kramer, treasurer and sales manager. The plant has 23,000 sq. ft. of floor space and is equipped with shearing, stamping, welding and assembling machines and die and enameling departments.

The Columbia Silica Co. recently incorporated in Akron to manufacture sand blast sand, is building a plant near Akron. P. A. Snyder is president and J. E. Ruch, general manager.

Milwaukee

MILWAUKEE, Dec. 17.

HOLIDAY quiet pervades practically every division of the machine-tool business. Active inquiry is a heartening feature, which relieves the lack of buying. The first half of December witnessed some fair orders for single items, but business showed a decline from the November average. Inquiry involves possible small-lot purchases, which probably will not be made until after inventories are taken. The industrial situation appears sound and gives promise of well sustained activity. New enterprises of an apparently substantial nature are in process of establishment which will mean a moderate volume of buying, both of new and used machinery.

The Sivyer Steel Casting Co., Milwaukee, has increased its capitalization to $900,000, consisting of $700,000 common and $200,000 preferred stock, to handle its business growth. Further enlargement of the works at Thirty-seventh Avenue, is in prospect during the coming year. Fred L. Sivyer is president.

The Field Motor Co., Rice Lake, Wis., incorporated several months ago with an initial capital of $25,000, has completed experimental work on a new design of passenger automobile and contemplates the erection of a one-story brick and steel assembling shop, 60 x 150 ft., early in the spring. Production of parts will be contracted for at the outset. The O. E. Szekely Co., Moline, Ill., is manufacturing the engine. T. H. Field is president, and R. C. Peck, secretary, of the Field company.

The Milwaukee Sewerage Commission, 508 Market Street, Milwaukee is asking bids until Dec. 21 for furnishing 340 standard manhole frames and covers for delivery within twelve months from date of contract. John H. Fowles is secretary.

The Manegold Mfg. Co., Milwaukee, has been incorporated with a capital stock of $50,000 to manufacture metal products, principally handles, locks and other fittings and parts for automobile bodies. The principals are William H. Manegold and Frank W. Manegold, who has been for many years secretary Briggs & Stratton Co., Milwaukee. Definite plans have not been made public but negotiations are pending for the lease of a building which will require considerable new equipment. Temporary offices are at 867 Summit Avenue, Milwaukee.

The Belle City Malleable Iron Co., Racine, Wis., has started work on the erection of the second section of its new annealing building. Each unit is 77 x 155 ft. The work is part of a plant replacement and improvement program involving an outlay of $900,000.

The Marathon Battery Co., Wausau, Wis., has been chartered with a capital stock of $150,000 to manufacture storage batteries, dry cells, electrical machinery and similar goods. A building has been leased and purchases of equipment are about to be made. The principals are Edgar J. McEachron and W. H. Thom of Wausau, and E. A. Fuller of Madison, Wis.

The American Mill Supply Co., 1718 Vliet Street, Milwaukee, will build a new warehouse, shop and service building, 40 x 135 ft., part two stories and basement, at 1371-1375 Auer Avenue. With equipment the investment will be about $45,000. The architect is Hugo V. Miller, 646 Twenty-sixth Street, local.

The Board of Education, Antigo, Wis., has engaged Claude & Starck, architects, Madison, Wis., to design a $125,000 junior high and vocational training school, 68 x 122 ft., two stories and basement. Bids will be taken about March 1 and equipment will be purchased next summer. J. P. Waddell is city superintendent of schools.

The American Plier & Tool Corporation, Milwaukee, has been organized by Oliver L. O'Boyle, Walter S. Bronk and George F. Tidmarsh, 133 Third Street, with $50,000 capital stock to establish a factory to produce a general line of mechanics' tools and equipment for the automotive industry. It is planned to lease a building and purchase machines for working forgings and other parts.

The Manitowoc Church Furniture Co., Waukesha, Wis., will begin work at once on the erection of a $75,000 addition, 100 x 160 ft., one story, at 1214 Lincoln Avenue. The present wood and metal-work equipment will be materially supplemented. C. F. Schuetzke is general manager.

The Nippert Mfg. Co., Sturgeon Bay, Wis., has been organized by J. W. Nippert and Walter Haertel to manufacture hardware specialties and metal products. A site has been purchased on the bay front for a machine shop to be erected next spring. At the start attention will be concentrated on a patented window and screen fastener and other building specialties. Later other products will be added to the line. The new concern is capitalized at $50,000.

The Board of Education, Appleton, Wis., which recently rejected all bids entered for the construction of two junior high schools and industrial training buildings, has ordered revised plans from Perkins, Fellows & Hamilton, architects, 814 Tower Court, Chicago and will take new bids after Jan. 1. The estimated cost is $150,000 each. Paul V. Cary, 803 College Avenue, is chairman, building committee.

The Wesley Steel Treating Co., 651 South Pierce Street, Milwaukee, has increased its capital stock from $25,000 to $50,000 and plans to enlarge its shop and install additional furnaces.

The Board of Education, Mayville, Wis., is having plans revised by Parkinson & Dockendorff, architects, LaCrosse, for the proposed new $200,000 high school. Original bids exceeded the appropriation. New tenders will be asked some time in January. O. D. Naber is chairman, building committee.

Joseph J. Plank & Co., Appleton, Wis., specializing in the manufacture of dandy rolls, used by paper manufacturers for water-marking, has received an order from Yokohama, Japan, for 16 rolls, the largest export order the Appleton company has ever booked. Other Fox River Valley manufacturers of paper mill machinery and specialties report unusually large orders from Japan.

The Reid Clipper Co., Racine, Wis., has been incorporated with an initial capital of $6,000 to manufacture electric motor-driven industrial and domestic appliances, featuring an automatic tool for barbers, veterinarians, etc. M. Andis of the Andis Tool Co., Racine, is forming the new organization in association with H. H. Cochran and H. J. Vincent.

The Board of Education, Mineral Point, Wis., has accepted plans by Edward Tough, architect, Madison, for the proposed new $150,000 high school, with manual training departments, to be erected next year. Bids probably will be asked for construction early in January. Allen M. Tucker is secretary of the board.

The Steel Products Corporation, Sheboygan, Wis., organized with $50,000 capital to take over the automobile bumper and accessory department of the Jenkins Machine Co., same city, is buying some additional tools, but will defer its main purchases until it establishes a plant of its own. For the present quarters are being leased from the Jenkins company. A. G. Stuedeman is president; Robert C. Ebenreiter, vice-president; Fred Zschetzsche, secretary-treasurer and general manager.

The Kimberly, Wis., Board of Education has engaged Oppenhamer & Obel, architects, Green Bay and Wausau, Wis., to design a combination high, junior high and vocational training school, to be built in three units costing $100,000 to $125,000 each. Plans probably will be ready for bidders on Feb. 1. M. H. Kettenhofen is secretary.

Gulf States

BIRMINGHAM, Dec. 17.

BIDS will be received by the United States Engineer Office, Trust Company Building, Galveston, Tex., until Dec. 24, for two cast steel swinging sheave housings, circular 24-60; until Dec. 26 for six cast steel spud cable idler sheaves, two cast steel spud idler drums, and patterns, circular 24-57.

The Piedmont Ice Co., Piedmont, Ala., recently organized, is having plans drawn for an ice-manufacturing and

refrigerating plant. J. M. Townley, Carbon Hill, Ala., is head.

The Middle States Oil Co., New Orleans, will install additional squipment at its local refinery to cost $75,000. P. D. Saklatvala is president.

Fire, Dec. 11, destroyed a portion of the plant of the Rigsbee Electric Co., 1800 Main Street, Dallas, Tex., with loss estimated at $25,000. It is planned to rebuild.

The Nashville, Chattanooga & St. Louis Railway Co., Nashville, Tenn., has acquired the plant and property of the Cumberland Coal & Lime Co., Cumberland, near Bridgeport, Ala., and has plans for a crushing and sorting plant for ballast production, including electric power equipment. H. McDonald, Nashville, is chief engineer.

The Chamber of Commerce, Tuscaloosa, Ala., is in negotiation with a paper manufacturing company, name temporarily withheld, for the construction of a paper mill on a tract to be donated. A power house will be built. It is estimated to cost $2,000,000 including machinery.

Fred H. Jones, First and Commerce Streets, Fort Worth, Tex., will take bids until about Jan. 1, for a new three-story plant, 100 x 100 ft., for the manufacture of automobile equipment and accessories, estimated to cost $100,000 including equipment. Earl T. Glasgow, First National Bank Building, is architect.

The Great Southern Lumber Co., Bogalusa, La., will commence foundations in January for a new mill at New Orleans for the production of paper-board products, to include a power house, estimated to cost $1,000,000 with machinery.

W. S. McDaniel, Columbus, Tex., and associates are perfecting plans for a hydroelectric power station on the Colorado River, near the city, to cost $150,000 including machinery.

The City Council, Hillsboro, Tex., has authorized the installation of electric pumping machinery at the municipal waterworks to replace present steam-driven equipment.

Charles F. Mould, 222 Magnolia Avenue, Daytona, Fla., has inquiries out for electroplating equipment.

Manual training equipment will be installed in the new school to be erected at White Street and Esplanade Avenue, New Orleans, by the Parish School Board, estimated to cost $175,000. E. A. Christy is city architect, in charge.

The New Orleans Dock Board, New Orleans, is planning the installation of additional machinery at the municipal coal tipple on the city docks.

H. T. Phelps, Hicks Building, San Antonio, Tex., has inquiries out for a jaw type crushing machine, about 100 tons capacity, with auxiliary equipment.

Fire, Dec. 6, destroyed a portion of the plant of the Letellier, Phillips Paper Co., 623-45 South Front Street, New Orleans, with loss estimated at $50,000. It is planned to rebuild.

The Elephant Butte Irrigation District, Las Cruces, N. M., and the El Paso Water Improvement District, El Paso, Tex., are planning the construction of a joint hydroelectric generating plant at the Elephant Butte dam, with secondary power plant on neighboring site, estimated to cost $4,000,000 with machinery. H. H. Brook is president and manager of the first noted organization.

The Municipal Light and Water Department, Lakeland, Fla., Charles Larsen, superintendent, plans the installation of two 2000-gal. per min. capacity centrifugal pumps at the city waterworks, with auxiliary machinery, estimated to cost $150,000.

The Florida Paper Mills Co., recently organized as a subsidiary of the Grass Fibre Pulp & Paper Co., Leesburg, Fla., will commence foundations for the first unit of its proposed mill at South Jacksonville, with power house, estimated to cost $250,000. Gilbert Leach is secretary and treasurer.

Fire, Dec. 5, destroyed the ice-manufacturing plant of the Eureka Ice Co., Jackson and Commerce Streets, Houston, Tex., with loss estimated at $150,000 including equipment. It is planned to rebuild.

The Gulf States Chemical & Refining Co., Birmingham, has leased a building at Montgomery, Ala., and will remodel and install machinery for a new plant, to cost approximtely $60,000. It is expected to erect new works at this location later. A. M. Kennedy is general manager.

The White Co., Leeland Street, Houston, Tex., manufacturer of automobile trucks, with headquarters at Cleveland, has awarded a general contract to J. Statler, Austin Street, for a one-story service and repair building, 100 x 100 ft., to cost about $65,000. P. E. Seamans is local manager.

The Common Council, Marianna, Fla., has preliminary plans for the construction of a municipal hydroelectric generating station on the Chipola River, to cost about $100,000.

The Southwestern Bell Telephone Co., Capitol Avenue, Houston, Tex., will commence the construction of an eight-story machanical and storage building, with machine and electrical repair works, to cost about $100,000.

The Alabama Polytechnic Institute, Auburn, Ala., will take bids in about a month for a new three-story engineering and mechanical building, 190 x 200 ft., estimated to cost $300,000. Warren, Knight & Davis, Empire Building, Birmingham, are architects.

B. A. Finch, 500 North Akard Street, Dallas, Tex., is planning to purchase machinery for a marble quarrying and finishing plant, electrically-operated, including polishing and handling machinery.

The Atlantic Refining Co., Beaumont, Tex., has preliminary plans for the construction of a pipe line, with pumping unit, to its storage plant on the Neches River, estimated to cost $100,000.

South Atlantic States

BALTIMORE, Dec. 17.

BIDS will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until Jan. 8, for wire and cable for Eastern and Western yards, schedules 1700 and 1701; also for two induced draft fans and spare parts for the Norfolk Navy Yard, schedule 1687.

The Stasco Milling Co., care of the Industrial Bureau, Board of Trade, Baltimore, said to be affiliated with the Stasco Laminated Slate Co., Poultney, Vt., has purchased property at Whiteford, near Baltimore, and will commence the erection of a plant for the production of roofing slate, estimated to cost $250,000 with machinery. It will include a power house and machine shop.

The Common Council, North Wilkesboro, N. C., has authorized plans for rebuilding the municipal electric power plant, recently destroyed by fire, to cost $85,000, including oil-operated engines, generator, switchboard, etc., for which bids will soon be asked. S. L. Pardue, city clerk.

The Johnson Wire & Iron Works, High Point, N. C., manufacturers' agents, is in the market for a new or used power punch, about ⅝-in., motor drive; also for an electric welding machine and spot welder.

The Bureau of Foreign and Domestic Commerce, Washington, has information regarding the construction of two or more match manufacturing plants in England, where American machinery will be required, estimated to cost $2,000,000. Reference No. 13127.

The Virginian Railway Co., Norfolk, Va., has issued bonds for $5,000,000, a large part of the proceeds to be used for the electrification of a portion of its lines. Plans have been drawn for the initial power plant at Narrows, Va., to cost about $250,000.

The Southern Iron & Equipment Co., 217 Grant Building Atlanta, Ga., is in the market for a turret lathe.

Bids will be received by the General Purchasing Officer, Panama Canal, Washington, until Jan. 2, for electric motor, nails, track bolts, splice bars and similar equipment, circular 1580.

The Consolidated Veneer & Panel Co., High Point, N. C., plans a new three-story factory on Manning Street to cost $25,000 exclusive of equipment.

The Taylor-Parker Co., Water Street and Commerce Place, Norfolk, Va., has inquiries out for two fuel oil engines, 40 hp. and 100 hp. respectively; also for two watertube boilers, 250 to 300 hp., and auxiliary equipment. C. A. McLean is head.

The Austell Cabinet Co., Austell, Ga., recently organized, has plans for a new factory, 400 x 755 ft., to cost about $100,000, with machinery and power equipment. Roy S. Mather, Mather Brothers, Atlanta, Ga.; E. E. Yarborough and A. B. Harrington, both of Austell, are heads.

Manual training equipment will be installed in the new high school to be erected at Hickory, N. C., estimated to cost $225,000, for which bids will be taken at once on general contract. C. Gadsden Sayre, Anderson, S. C., is architect.

The Baxter & Allen Iron Works, Inc., 47 Pinckney Street, Charleston, S. C., desires information and prices of equipment for a brass foundry, including electric furnaces, etc.

Ovens, power equipment, conveying and other machinery will be installed in the two-story and basement baking plant, 100 x 160 ft., to be erected by the Carolina Baking Co., Charlotte, N. C., estimated to cost $250,000. The McCormick Co., Inc., Century Building, Pittsburgh, is architect. H. O. Miller, president.

The Bureau of Foreign and Domestic Commerce, Washington, has information of a company at Vienna, Austria, in

the market for knives for leather-working machinery, No. 8435; of a firm at Santiago, Chile, desiring to purchase American roof-plate manufacturing machinery, No. 8395; a concern at Calais, France, desiring automatic unloading machinery for material from vessels, No. 8493; a company at Durban, South Africa, inquiring for American wire nail manufacturing machinery, No. 8476; a firm at Bangkok, Siam, desiring sawmill machinery, No. 8404; a concern at Halifax, N. S., desiring to purchase machines and tools for machine shop, pulp wood grinders, 4000 hp. motor, and other equipment, No. 8461; and a company at Buenos Aires, Argentina, for fruit canning machinery, No. 8399.

The Common Council, Louisa, Va., is planning to rebuild its municipal electric plant and waterworks station recently destroyed by fire. A list of machinery will soon be available.

William H. F. Thielman, R. F. D. No. 1, Barnett, Ga., is in the market for machinery for a shingle and lath mill.

The Board of District Commissioners, District Building, Washington, will erect a two and three-story addition, 100 x 140 ft., to the Armstrong manual training school, near Third Street, to cost $500,000 with equipment. A. L. Harris, District Building, is architect.

R. E. Carrington, Sanford, N. C., has plans for a local ice-manufacturing and pre-cooling plant, and will make inquiries for machinery and power equipment at once.

A manual training department will be installed in the new school to be erected at Claymont, Del., estimated to cost $275,000, for which bids will soon be asked on general contract. The Board of Education is in charge.

An electric power plant will be constructed by the Appalache Hosiery Mills, Landrum, S. C., at its proposed mill estimated to cost $85,000. Joseph Lee is president.

The Paul Rubber Co., Salisbury, N. C., is in the market for tools, pumping equipment, buffing wheels, boilers and other machinery.

Bids will be received by the Norfolk & Western Railway Co., J. H. Clemmitt, purchasing agent, Room 351, N. & W. Railway Building, Roanoke, Va., until Dec. 26, for requirements for steel springs from Jan. 1 to March 31, Contract Serial No. AA-282; also for requirements for wire fencing, same period, Contract Serial AA-284, and other equipment.

The Georgia Mirror & Plating Co., 309 Albany Street, Waycross, Ga., has inquiries out for an electric plating machine.

The Ault Mfg. Co., High Point, N. C., has a list of machinery wanted for installation in a local furniture manufacturing plant.

The Locke Insulator Corporation, Baltimore, will erect a one-story brick building, 81 x 122 ft., at Charles and Cromwell Streets at a cost of $15,000.

Pacific Coast

SAN FRANCISCO, Dec. 12.

BIDS are being asked by the Weber Showcase Co., 316 South Los Angeles Street, Los Angeles, for a new one-story plant, 360 x 800 ft., estimated to cost $200,000 with machinery. A mechanical conveyor will be installed. Walker & Eisen, Pacific Finance Building, architects.

The Los Angeles Ironall Co., 502 Hass Building, Los Angeles, is having plans drawn for a six-story factory, 100 x 150 ft., to cost about $165,000 with machinery. Frank D. Chase, Inc., Title Insurance Building, is architect and engineer.

The city of Los Angeles, Harbor Department, City Hall, has awarded a contract to the Austin Co., Los Angeles, for a one-story cotton compressing plant, 150 x 500 ft., at Municipal Pier No. 1, San Pedro, to cost about $85,000. Presses and other machinery will be installed.

The Utah Power & Light Co., Salt Lake City, Utah, has plans for an addition to its steam-operated electric power plant at West Salt Lake, estimated to cost $1,500,000 with machinery.

The Northwest Copper & Sheet Metal Works, Seattle, has awarded contract to A. E. Sandstrom, Seattle, for a one-story plant, 100 x 100 ft., at East Madison and Sixth Streets, estimated to cost $40,000 with equipment. Edmund Bergholtz, Spalding Building, is architect.

R. C. Durant and Albert G. Waddell, both of Oakland, Cal., are organizing a company to manufacture transmissions and gears for automobiles, primarily of Starr type, invented by C. B. Starr, interested in the new concern. Plans are under way for works at Los Angeles estimated to cost $1,000,000 with machinery.

The Southern California Edison Co., Los Angeles, has engaged Stone & Webster, Inc., 147 Milk Street, Boston, engineer, to prepare plans for an addition to its steam-operated electric generating plant at Long Beach, to cost approximately $2,000,000. It will provide for an increase of 80,000 hp. in capacity.

Manual training equipment will be installed in the one and three-story junior high school to be erected at the Exposition and Harvard Boulevards, Los Angeles, estimated to cost $350,000, for which plans will be prepared by Frederick J. Soper, 1105 Kerckhoff Building, architect.

The State Highway Commission, Forum Building, Sacramento, Cal., has authorized the construction of a one-story machine and repair shop for State equipment at Lankershim, estimated to cost $35,000.

The Southern Pacific Railroad Co., Los Angeles, has awarded a general contract to Charles A. Fellows, Central Building, for a one-story locomotive shop at its Alhambra Avenue yards, 80 x 500 ft., primarily for engine erecting, estimated to cost $200,000. One 200-ton and two 15-ton traveling cranes will be installed.

The Harris Ice Machine Works, 174 East Water Street, Portland, will commence the erection of a one-story machine shop at 188 Tillamook Street, to cost $25,000. J. F. Foss, 969 Knott Street, is architect.

The Los Angeles Concrete Tile Co., I. W. Hellman Building, Los Angeles, has acquired 4 acres at Mission Road and Fremont Avenue, for a new plant, consisting of two buildings, one and two-story, 70 x 200 ft., and one-story 75 x 150 ft., with power house, estimated to cost $75,000.

The Union Oil Co., Union Oil Building, Los Angeles, plans the construction of a pipe line from the Torrance oil field to its refinery at Wilmington, Los Angeles Harbor, with pumping station and auxiliary equipment.

Canada

TORONTO, Dec. 17.

MACHINE tools sales have fallen off slightly the past few days as a result of the approaching holidays, but inquiries continue to make their appearance and it is the opinion that the demand for equipment will be resumed actively after the first of the year. The Canadian Pacific and Canadian National railroads have been ordering only tools urgently needed for replacement, but it is understood that some good sized lists will be forthcoming early in 1924.

The automotive industry is also showing interest in the market but inquiries indicate a tendency to buy later. A feature of present conditions is that in addition to inquiries, received by dealers, some of the larger purchasers are entering the market and placing fair sized orders for equipment without first sending out inquiries or lists. Small tools are moving steadily.

The Acme Supply Co., 7 St. Nicholas Street, Montreal, is in the market for an automatic jig saw.

A. Dumas, 2155 Papineau Avenue, Montreal, will purchase tools for a welding and repair shop.

A. Desjardine, 3872 Notre Dame Street, Montreal, is asking for complete equipment for a forge shop.

E. Clavel, 2836 St. Dominique Street, Montreal, will purchase drill press and other tools for a forge shop.

The Canadian Iron Foundries, Ltd., Fort William, Ont., whose plant was recently damaged by fire has started to rebuild and is interested in equipment for a furnace room and foundry.

Bruce & Price, 159 Prince Street, Montreal, are asking for prices and information on complete foundry equipment.

The Canada Spool & Bobbin Co., Walkerton, Ont., will increase the output of its plant and is interested in equipment for manufacture of spools, bobbins, etc.

Bisson & Dube, 867 Bordeaux Street, Montreal, are asking for a drill press.

Tindal Brothers, Morrisburg, Ont., will purchase miscellaneous small tools, shears, lathe, etc., for a garage.

The J. B. Watson Furniture Co., Kincardine, Ont., proposes to build a $20,000 addition to its factory and is interested in the purchase of machinery for manufacture of reed chairs, etc.

The Shale Brick Co. of Canada, Ltd., Crown Office Building, Toronto, will build an addition to its machine shop at Cooksville, Ont.

The Canadian Mirror & Novelty Mfg. Co., Hull, Que., will build an addition to its factory to cost $40,000.

The Empire State Ice Co., Chicago, and Windsor, Ont., has started work on the erection of an ice plant at Windsor to cost $200,000.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of items the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-Ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	
Refined iron bars, base price	3.54c.
Swedish charcoal iron bars, base	7.00c. to 7.25c.
Soft steel bars, base price	3.54c.
Hoops, base price	5.19c.
Bands, base price	4.39c.
Beams and channels, angles and tees, 3 in. x ¼ in. and larger, base	3.64c.
Channels, angles and tees under 3 in. x ¼ in., base	3.54c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	3.60c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	4.10c.
Toe-calk, ½ x ⅜ in. and larger	4.60c.
Cold-rolled strip, soft and quarter hard	7.50c. to 8.50c.
Open-hearth, spring steel	4.50c. to 7.50c.
Shafting and Screw Stock:	
Rounds	4.40c. to 4.65c.
Squares, flats and hex	4.90c. to 5.15c.
Standard tool steel, base price	15.00c.
Extra tool steel	18.00c.
Special tool steel	23.00c.
High speed steel, 18 per cent tungsten	75c. to 80c.

Tank Plates—Steel

¼ in. and heavier	3.64c.

Sheets

Blue Annealed

	Per Lb.
No. 10	4.34c.
No. 12	4.39c.
No. 14	4.44c.
No. 16	4.54c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet Per Lb.
Nos. 18 to 20	4.40c. to 4.70c.	.....
Nos. 22 and 24	4.45c. to 4.85c.	5.10c.
No. 26	4.50c. to 4.90c.	5.15c.
No. 28	4.60c. to 5.00c.	5.25c.
No. 30	4.80c. to 5.20c.	.....

No. 28 and lighter, 36 in. wide, 20c. higher.

Galvanized

	Per Lb.
No. 14	4.70c. to 5.10c.
No. 16	4.85c. to 5.25c.
Nos. 18 and 20	5.00c. to 5.40c.
Nos. 22 and 24	5.15c. to 5.55c.
No. 26	5.30c. to 5.70c.
No. 27	5.45c. to 5.85c.
No. 28	5.60c. to 6.00c.
No. 30	6.05c. to 6.45c.

No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel	Black	Galv.	*Wrought Iron*	Black	Galv.
½ in. Butt...	—41	—24	½ in. Butt...	— 4	+19
¾ in. Butt...	—46	—32	¾ in. Butt...	—11	+ 9
1-3 in. Butt..	—48	—34	1-1½ in. Butt.	—14	+ 6
2½-6 in. Lap.	—44	—30	2 in. Lap....	— 5	+14
7-8 in. Lap..	—41	—11	2½-6 in. Lap.	— 9	+ 9
9-12 in. Lap..	—34	— 6	7-12 in. Lap..	— 3	+16

Steel Wire

BASE PRICE* ON No. 9 GAGE AND COARSER	Per Lb.
Bright basic	4.75c. to 5.00c.
Annealed soft	4.75c. to 5.00c.
Galvanized annealed	5.40c. to 5.65c.
Coppered basic	5.40c. to 5.65c.
Tinned soft Bessemer	6.40c. to 6.65c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	17¾c. to 18¾c.
High brass wire	18¼c. to 19¼c.
Brass rods	15½c. to 16½c.
Brass tube, brazed	25¾c. to 27¼c.
Brass tube, seamless	22 c. to 23 c.
Copper tube, seamless	23½c. to 24½c.

Copper Sheets

Sheet copper, hot rolled, 21c. per lb. base.

Cold rolled, 14 oz. and heavier, 3c. per lb. advance over hot rolled.

Tin Plates

Bright Tin		Coke—14 x 20		
	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20		Prime	Seconds
			80 lb.	$6.55	$6.30
			90 lb.	6.65	6.40
			100 lb.	6.75	6.50
IC.	$12.55	$10.70	IC.	7.00	6.75
IX.	13.95	12.55	IX.	8.25	8.00
IXX.	15.55	13.75	IXX.	9.50	9.25
IXXX.	17.10	15.30	IXXX.	10.75	10.50
IXXXX.	18.85	16.80	IXXXX.	12.00	10.75

Terne Plates

8 lb. coating, 14 x 20

100 lb.	$7.00 to $8.00
IC	7.25 to 8.25
IX	8.25 to 8.75
Fire door stock	9.00 to 10.00

Tin

Straits pig	50c.
Bar	58c. to 60c.

Copper

Lake ingot	15¾c.
Electrolytic	15¼c.
Casting	14¼c.

Spelter and Sheet Zinc

Western spelter	7¾c.
Sheet zinc, No. 9 base, casks	10½c. open 11c.

Lead and Solder*

American pig lead	8½c. to 8¾c.
Bar lead	10½c. to 12c.
Solder ½ and ½ guaranteed	34¾c.
No. 1 solder	32¾c.
Refined solder	28¾c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb	75c. to 90c.
Commercial grade, per lb	35c. to 50c.
Grade D, per lb	25c. to 35c.

Antimony

Asiatic	11c. to 12c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb	36c.

Old Metals

Business is quiet and values unchanged. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible	11.00
Copper, heavy wire	10.25
Copper, light bottoms	9.00
Brass, heavy	6.00
Brass, light	5.00
Heavy machine composition	9.00
No. 1 yellow brass turnings	6.25
No. 1 red brass or composition turnings	8.00
Lead, heavy	6.25
Lead, tea	5.25
Zinc	4.00
Cast aluminum	15.75
Sheet aluminum	15.75